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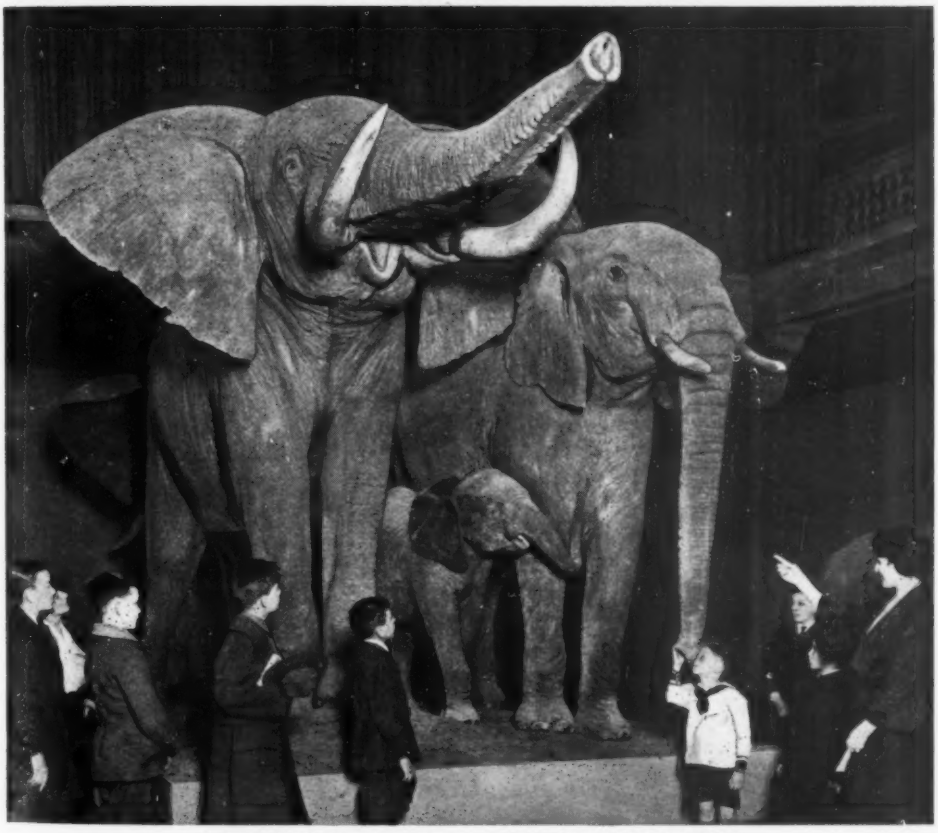

A LESSON ABOUT ELEPHANTS AT THE AMERICAN MUSEUM

JOURNAL OF THE AMERICAN MUSEUM OF NATURAL HISTORY

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GETTING ACQUAINTED

By visiting the mountain goat group in the American Museum this little girl is acquiring knowledge about an animal that has been seen in its inaccessible native haunts by comparatively few individuals. Gladly would she push aside the protective barrier of glass that separates her from her shaggy friend

WHAT THE AMERICAN MUSEUM IS DOING FOR THE SCHOOL CHILDREN OF NEW YORK

BY

GEORGE H. SHERWOOD*

LONG before the advent of motion pictures, even long before the stereopticon and its forerunner, the magic lantern, made their appearance, museums were the great exponents of objective teaching. It is true that for many years they were passive or static agents of instruction, disseminating knowledge chiefly to the more or less casual visitor, and were less concerned with the imparting of information than with the preservation of records—scientific or historical. This viewpoint has passed away and the modern museum now stands as an aggessive force in education. This is particularly true of natural history museums.

Through improvements in the technique of preparation, through attractive and appealing labels, and through the development of the habitat group idea, which shows the interrelation and interdependence of all life, the exhibition halls of the up-to-date natural history museum have become veritable magnets to which are drawn both young and old. The instruction thus imparted is, however, somewhat casual and it is rather through direct contact with school systems that museums have become entitled to consideration as important factors in education.

From its inception in 1869 the American Museum of Natural History has taken an active part in educational affairs. The incorporators of the institution had in mind close contact with the schools, and its first curator of education, Professor Albert S. Bickmore, may be regarded as the father of visual instruction. Throughout the period of his curatorship, 1881–1904, he was an enthusiastic believer in the teaching value of lantern slides and through his lectures to the teachers of the state his reputation became national. When he took hold of this work, the technique of making lantern slides was in its infancy and simple projection machines had not been developed. Professor Bickmore ransacked the corners of the earth for the best material. There was not a traveler of note who came to New York whom he did not seek out and ask for his negatives. He journeyed to remote lands himself, to obtain first-hand information, and in later years often sent out special photographers in order to secure the best results possible. One of the greatest contributions which the American Museum has made to visual education is this work of Professor Bickmore. Even today, notwithstanding the great advance in photography, the excellence of a "Bickmore slide" is seldom, if ever, surpassed.

During Professor Bickmore's curatorship the Museum's service to the schools consisted chiefly of instruction for teachers. In 1904 a new policy, namely, instruction for children, was inaugurated, which, under the presidency of Prof. Henry Fairfield Osborn, a lifelong student of educational methods, prevails at the present time. As New York City annually contributes generously to the maintenance of the Museum, it is proper that the Museum should give special attention to the needs of the schools of the city. Thus the methods of instruction which have been developed by the American Museum during the last eighteen years are designed to meet the conditions of the local school system. They are, however, based on such fundamental, pedagogical principles that they may be easily modified to apply to any other school system.

The school service of the American Museum of Natural History includes

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There are at present a total of 869 nature study collections, which the American Museum lends without charge to any public school in Greater New York. In 1921, 477 schools were regularly supplied, and the collections were studied by nearly 1,300,000 pupils

the circulation of nature study collections in the schools, the delivery of illustrated lectures for school children at the Museum and in the schools, the lending of lantern slides to teachers, guide service and exhibitions within the Museum, hall instruction for visiting classes, instruction for the blind, exhibitions in public libraries, and the preparation of aids for particular needs of teachers—for example, in art and domestic science classes and in training schools for teachers. These activities are carried on through the Museum's department of public education.

The program of school service adopted by the Museum has the hearty endorsement of the Board of Education, superintendents, and other school officials, but the conduct of the work is left entirely to the department of public education of the Museum, which is responsible for the relation with the schools. This action on the part of the school authorities has been an important factor in the success of the work, because it has simplified the service and brings the Museum's staff in direct contact with the principals and teachers, thereby leading to a better understanding of their needs.

The oldest feature of this service and the most extensive is the circulation of nature study collections. This work was begun in 1904. The collections are of small size, each being contained in a wooden carrying case, which is about the size of a large suit case. The material comprises representative specimens of mammals, birds, insects, lower invertebrates, minerals, woods, and public health charts and exhibits. The purpose of these collections is to place in the hands of teachers good nature material that is required for classroom instruction and at the same time give authoritative data in regard to it.

The general make-up of the various collections is similar. Take the "bluebird set" as an example. This collection consists of five birds—bluebird, phœbe, barn swallow, house wren, and chimney

Quick delivery of lantern slides and nature study collections is assured through the employment of three messengers and the maintenance of two automobiles and a motor cycle sidecar. Each messenger visits from twenty to forty schools a day. The motor cycle used in making these deliveries often travels one hundred miles in a day

swift. Incidentally this series has an added interest as it shows five birds the nesting habits of which have been modified by contact with man. Each bird is mounted on a separate pedestal and is easily removable from the carrying case. An individual label is attached to it, giving a few facts concerning it. The collection as a whole is accompanied by a manuscript, prepared in consultation with the curator of birds, describing the principal habits of these birds, their relation to each other, and especially to man. Reference is made to the local bird collection in the Museum, which is changed every month to correspond with the bird life of our city parks, and in conclusion a brief bibliography of popular books on the subject is offered as a suggestion for school reading. This scheme has been followed in the case of most of the collections, although some modification has been necessary in certain subjects.

Access to these collections has been made as simple as possible for teachers. Museum messengers deliver the collections in the desired sequence to any public school in Greater New York and call for them at the end of each loan period, that is, every three weeks. To make these deliveries the Museum employs three messengers and maintains two automobiles and a motor cycle side-

BIRDS THAT ARE OUR FRIENDS

This is a specimen of the contemplated new type circulating collection, in which the environment of a bird or a mammal is shown in addition to the creature itself. The label-holders are hinged to the back of the case and close over the ends, protecting the glass during transportation. The label at the left is general and gives reasons why birds are our friends. That on the right deals with the habits and use of the specific birds in the case, each bird being identified by a simple drawing instead of by title or number

car, which not infrequently covers one hundred miles in a day. The entire cost of this service is borne by the Museum.

From time to time new collections are added to the series. The circulating food exhibit, which has been in use for about a year, is an example of a special exhibit to meet a particular need. The proper nourishment of children is an important and vital problem, especially in New York City. Calories and figures mean little or nothing to either parents or children. Both can understand relative food values if they have placed before them objects showing correct portions for a proper diet. To aid the domestic science teachers, the department of public education in conjunction with the Museum's department of public health, prepared an exhibit showing the proper daily food for a child. This exhibit consists of attractive wax models of the foods listed in the accompanying table.

BREAKFAST	LUNCHEON	DINNER
Baked apple	Cream of tomato soup	Lamb stew
Oatmeal with milk	Whole wheat bread and butter	Potato
Two slices buttered toast	Stewed prunes	Spinach
Glass of milk	Cookies	Glass of milk
	Cup of cocoa	White bread and butter
		Rice pudding

These wax models are neatly packed in a small carrying case and so arranged that they can be quickly assembled to show the proper food and right portion for the breakfast, luncheon, and dinner of a normal, healthy child. The food value of each portion is clearly indicated and the exhibit is further explained by a series of illustrated wall charts giving dietary facts and figures. A leaflet setting forth the fundamental principles of the diet accompanies each collection. This is practical visual education carried into the home, as well as the school, because this exhibit is often requested for parents' association meetings.

A contemplated addition to our circulating collections of wild life is a series of the habitat group type, which is intended to give more of the environment of a species than is possible in the case of the hand specimens of the earlier collections. One of these habitat groups, "Birds That Are Our Friends" has been completed and is now undergoing in the New York Training School for Teachers a practical test as to its instructional value. Several others are in preparation and still others projected.

These new collections, for which special cases have been designed, are intended mainly to supplement the earlier collections, not to replace them. As will be seen from the illustration on page 104 this kind of exhibit has a painted background suggestive of habitat. The case was modified from the type in use by the Field Museum of Natural History in its school work. At each end there is a hinged wing which, when open, serves as a label holder and when closed, protects the glass ends of the case. In the left wing is a general label giving some of the reasons why birds are useful to man. The label in the right wing deals with the habits and service of the individual birds of the exhibit. Another new feature is the identification of the bird in the exhibit by means of an outline drawing of the bird to scale on the label. In a modification of this type of label it is the intention to substitute for the outline drawing in some cases photographs from nature showing the bird in its actual habitat.

Each of the circulating collections bears an identification number and title. On the reverse side of the card, which is carried in an appropriate label holder on each cabinet, is a form for recording the itinerary of each collection, the number of pupils using it, and the signature

"Indians of the Woodlands" is one of the collections lent to libraries. Such collections are placed in the children's rooms and stimulate the reading of good books. Libraries provided with collections by the American Museum—and fifteen libraries are at present availing themselves of this privilege—are visited by pupils from the schools of the neighborhood who, under the guidance of their teachers, study these exhibits. During 1921 more than 100,000 children and adults were instructed in this way

Public school teachers visiting the department of education, American Museum, to select slides for their classroom lectures. In 1921, no less than 182 schools were served, the number of loans were 3963 and more than 200,000 slides were circulated

of the teacher furnishing the data. The extent of this branch of the Museum school service is indicated by the comparative statistics of the last four years presented in the accompanying table.

	1918	1919	1920	1921
Number of collections in use	628	668	887	869
Number of schools in Greater New York supplied	419	385	448	477
Number of pupils studying collections	790,346	860,992	1,176,055	1,247,515

We learn from the teachers that not only have the collections proved their value in teaching facts about nature, but they have also been particularly useful in language work, especially with the foreign-born children. Perhaps their greater service, however, is giving these city children a glimpse at the great out-of-doors. The country dweller has very little conception of the limited horizon of thousands of these children in the congested parts of the city. Many of them never get more than a few blocks from the place where they were born. The school building is the limit of their travels. The dog, the cat, and the horse are the only animals they have ever seen. The vegetable market window or the flower-laden pushcart represent their knowledge of growing things. No wonder then that the little nature study exhibits from the Museum stimulate their imagination and broaden their outlook.

In one instance one of our bird collections was used as a basis for letter writing. It is evident that the teacher had suggested the general theme—a letter of thanks to the Museum for sending the beautiful birds, which were liked because of their pretty colors. The most suggestive and pathetic of the letters read something like this: "I thank you very much for sending to our school the beautiful birds. I think the robin is pretty because he has a red breast and the bluebird because of his blue coat, but the one I like best is the English sparrow because it is the only bird I have ever seen." What would this little girl think if she could make a trip to the real country!

Another illustration showing restricted environment is the following. The class was reading a poem dealing with the "signs of spring,"—daffodils, frogs, etc. The children did not comprehend the meaning of the phrase. Finally the teacher asked how we know that spring is here. Johnny was the only one who raised a hand. "Well, Johnny, how do you know that spring is here?" "Because I saw them hanging the swinging doors on the saloons." Certainly the nature study collections from the Museum helped to give Johnny a new conception of spring.

For several years the loan by the Museum of nature study material for schoolroom use has been well supplemented by the special exhibits lent to public libraries of the city. In the study collections of the Museum are clothing, pottery, baskets, industrial models, dolls, implements of war, birds, animals, and many other types of specimens that can be used with success to illustrate books on travel, geography, nature study, history, art, and current events. From these, with the coöperation of the curators of the several departments, circulating loan exhibits are selected. By arrangement with the librarians, such exhibits are installed in the children's rooms of the libraries for varying periods. These exhibits are naturally more extensive than those of the schoolroom type. They are adequately labeled and in some cases illustrated with large mounted photographs.

The primary purpose of these exhibits is to stimulate the children to read good books. More often the collections form the basis of definite coöperation between the schools and the libraries. Children who are studying Mexico in the classroom are taken by their teachers to the

DR. G. CLYDE FISHER LECTURING TO HIGH SCHOOL STUDENTS IN THE AMERICAN MUSEUM

library, where they examine the Mexican material loaned by the Museum and read books describing that country.

This coöperation with the libraries takes the Museum to the neighborhood. Oftentimes, moreover, these exhibits awaken the spirit of research, prompting both the child and his parents to visit the extensive collections at the Museum and then in turn to go back to the library for further reading.

Thus through the circulating nature study collections sent to the schools or through an exhibit in the library the school child receives his introduction to nature. Then comes the day when the teacher takes him and his mates to the Big Museum. Here the class is met by staff members who explain the wonders of each exhibition hall. Advanced classes, groups from the high schools and colleges, return again and again for observation and study. The well labeled exhibition hall becomes, therefore, a great silent teacher.

Annually upwards of 200 of the city schools and more than 100,000 school children come within the influence of the school lecture service of the Museum. This branch of the Museum's free nature education began in 1904 with a series of five lectures, illustrated with lantern slides, that was given in the auditorium of the Museum. Their success was immediate and their continuation strongly urged by the teachers, in spite of the fact that they were delivered after school hours.

For several years these lectures were held only at the Museum. Later, because of the difficulties of transporting large numbers of children through the city streets, and because the Museum authorities realized that many parents could not afford the necessary carfare, courses of the lectures were given in some of the schools. At the present time the system has been so developed and extended that our lecture service includes annually two long series of lectures at the Museum; two series in three local lecture centers; special lectures on request at the Museum and in certain schools; lectures for student teachers in the New York Training School for Teachers; the lending of lantern slides for lecture purposes to teachers of New York City, and special instruction for the blind.

As in the case of the circulating nature study collections, the underlying purpose of all these lectures is to *supplement* the classroom work of the teacher, not to *replace* it. The individual lecture, therefore, is usually general rather than specific in its scope and is to be regarded as a series of picture stories around a common theme, and not as a well-balanced presentation of one subject. Our aim is to treat each lecture so that it may be used either as an introductory lesson to a general topic to which the teacher may refer again and again in the classroom, or as a general review after the class has finished its study. From the lecturer's standpoint these lectures are often unsatisfactory because of their diffuse character, but we must always keep before us their primary purpose, namely, supplementing the teacher's work.

The subjects are chosen with special reference to the prescribed courses of study, and deal particularly with topics in geography, history, and natural science. All are illustrated with colored lantern slides and for some years past also with motion pictures. The lecturers are members of the staff of the department of public education, all of whom have had practical pedagogical training, or members of the Museum's general scientific staff who have an especial aptitude for talking to children.

Whenever practicable the subject matter of the lectures is correlated with the exhibits in the Museum. For instance, if the lecture is on the early history of New York City, reference is made to the eastern woodlands hall, where the life of the Indians of Manhattan is depicted; if the subject is physical geography of the United States, reference is made to the halls of geology and to the

halls of the great vertebrate fossils, where early earth history can be read and visualized.

In addition to the regular courses of lectures for school children, members of the Museum staff lecture at the New York Training School for Teachers, with the purpose of presenting to the student teachers certain background topics on which the lecturers are especially well qualified to speak. The result of this relation to the Training School is far-reaching.

Many special lectures are given to visiting classes, particularly those from high schools. Twice a year during Regents' Week, the examination period, the biology classes from several of the high schools are brought to the Museum, are given a lecture in the auditorium on some biological topic, and are then sent into the exhibition halls with a questionnaire for further study. Thus for these classes, as well as for groups of Boy Scouts, Girl Scouts, Woodcrafters, etc., the Museum exhibition halls serve for great indoor field trips.

A few years ago the Museum's lecture service was extended by the establishment of local lecture centers. Under this plan a centrally located school which has proper facilities is selected and the schools of the neighborhood are invited to send their classes to this school for the Museum lectures delivered there. For some time the Museum has been maintaining three such centers; namely in the Washington Irving High School; Public School 64, Manhattan; and Public School 42, The Bronx. The center at the Washington Irving High School approaches the ideal. One of the high school teachers makes all the arrangements with the local schools. On the appointed days the Museum lecturer goes to the center and then speaks to the pupils from the neighboring elementary schools. Thus these children have the benefit of the lectures without the long and hazardous journey to the Museum. There is no doubt that the local lecture center scheme should be extended.

Another important branch, recently developed, of the Museum's educational work is the lending of lantern slides to the teachers for use in the classroom. This work was undertaken in 1915 under a special grant from the Board of Education of New York and its almost phenomenal growth bids fair to make it the most extensive, if not the most important, of the visual instruction methods of the Museum. Through its expeditions and researches the Museum has accumulated many thousands of negatives and photographs. From these has been built up its lantern slide collection, now numbering 31,000 slides and covering a wide range of subjects. New material is being added continually. These slides are lent free of charge to any teacher in the New York public schools. Museum messengers deliver the slides to the schools and call for them at the end of the loan period, one week. Printed catalogues of the slides and order forms are sent out to teachers or are available on request.

Realizing the many demands on the time of teachers the Museum has further anticipated their needs by preparing a series of lectures illustrated with from sixty to eighty slides and accompanied by a suitable manuscript, which enables the teacher to give a lecture with a minimum of effort. Nearly 43 per cent. of the slides lent are in these prepared lecture sets, although they comprise only about one tenth of the number in the general file. In all there are thirty-seven of these sets, twenty of which have been duplicated. The subjects of the lecture sets are as varied as those in the regular lecture courses, including geography, history, industries, literature, art, and natural science.

The principal limitation on the use of this material at present is the lack of facilities and projection apparatus in the schools. The school authorities are slowly remedying the situation and the demands of the future will be greatly increased. As it is, 182 public schools of

Through the Jonathan Thorne Memorial Fund, the American Museum has been able to develop its work among the blind. The sightless child is permitted to handle specimens and thus secure an impression of the size and the form of an animal and "see" whether its covering is of fur, or scales, or feathers. The little girl in the picture is learning the configuration of the world by running her finger over the raised areas representing the continents

the city are being served regularly and the number of loans, the best index of growth, have increased from 1470 in 1919 to 3963 in 1921, or about 190 per cent.

A specialized branch of the Museum's educational work is the instruction for the blind, which has been developed through a special endowment, the Jonathan Thorne Memorial Fund. The blind children in New York City are taught in the same public schools as normal children. They are grouped in sight-conservation classes and are taught by trained teachers under the guidance of a special supervisor. In the Museum's program of education special provision is made for these children. In consultation with the supervisor for the blind, informal talks, which can be illustrated with actual specimens or with apparatus, are prepared by the Museum staff under such titles as "Birds of Our Parks," "Indians of the Plains," "Animals That Give Us Clothing," "Sea People and Their Castles," "The Change of Seasons," and are given at the Museum.

The small number of pupils—from nine to twelve in a group—makes it possible for each child to "see" carefully every article under discussion. These talks are planned both to supplement the prescribed school work and to add interest and general knowledge to the life of the blind child. The results from this work are gratifying. Oftentimes it is read in the happy faces of the children. Again it is seen in the essays based on

The life of the Antarctic has its fascinations for the children that visit the American Museum. The feeding of a young king penguin suggests an act of cannibalism on the part of the parent, but the label accompanying the exhibit explains that the young bird is securing food instead of serving as such

the lesson that are prepared by the children. One teacher writes: "General class instruction is easier because of their visits to the Museum. Children of little experience in life and meagre opportunity for general information speak with some ease and familiarity of animals, birds, people, and customs about which they have been informed under your guidance. I thank you heartily in behalf of these children, who scarcely realize to what extent you are broadening their horizon."

In the foregoing article we have presented the principal features of the methods of visual education employed by the American Museum of Natural History. We make no claim that they are new to education. They have been modified to meet the conditions in New York City. The wealth of material in the exhibition and study collections of the Museum, which its men of science have brought together from all parts of the world, the miniature collections, and the extensive series of negatives and slides that through the school service of the Museum are made freely available, give the New York child a rare opportunity to visualize his geography and history lessons, and offer compensation in a measure for his lack of contact with the outdoor world.

THE SCHOOL SERVICE BUILDING

AN ADDITION TO THE AMERICAN MUSEUM THAT WILL MAKE POSSIBLE FULLER COÖPERATION WITH THE PUBLIC SCHOOLS

ON APRIL 21, 1922, the Board of Estimate and Apportionment of the City of New York unanimously appropriated $570,000 for the construction and equipment of the SCHOOL SERVICE BUILDING of the American Museum of Natural History. This action of the city authorities opens a new period in the history of the Museum's relation to the schools and is significant appreciation of what the Museum is doing in bringing nature to the boys and girls of the city.

The work of the Museum with the schools during the last eighteen years, which is described in the preceding article of this number, has been carried on with inadequate facilities. The department of public education, which has immediate charge of these activities, has been housed, for the most part, in corridors, basements, and anterooms in various parts of the present edifice. In fact, under the circumstances, it is surprising that the Museum has attained the position of usefulness it now holds in the educational system of the city.

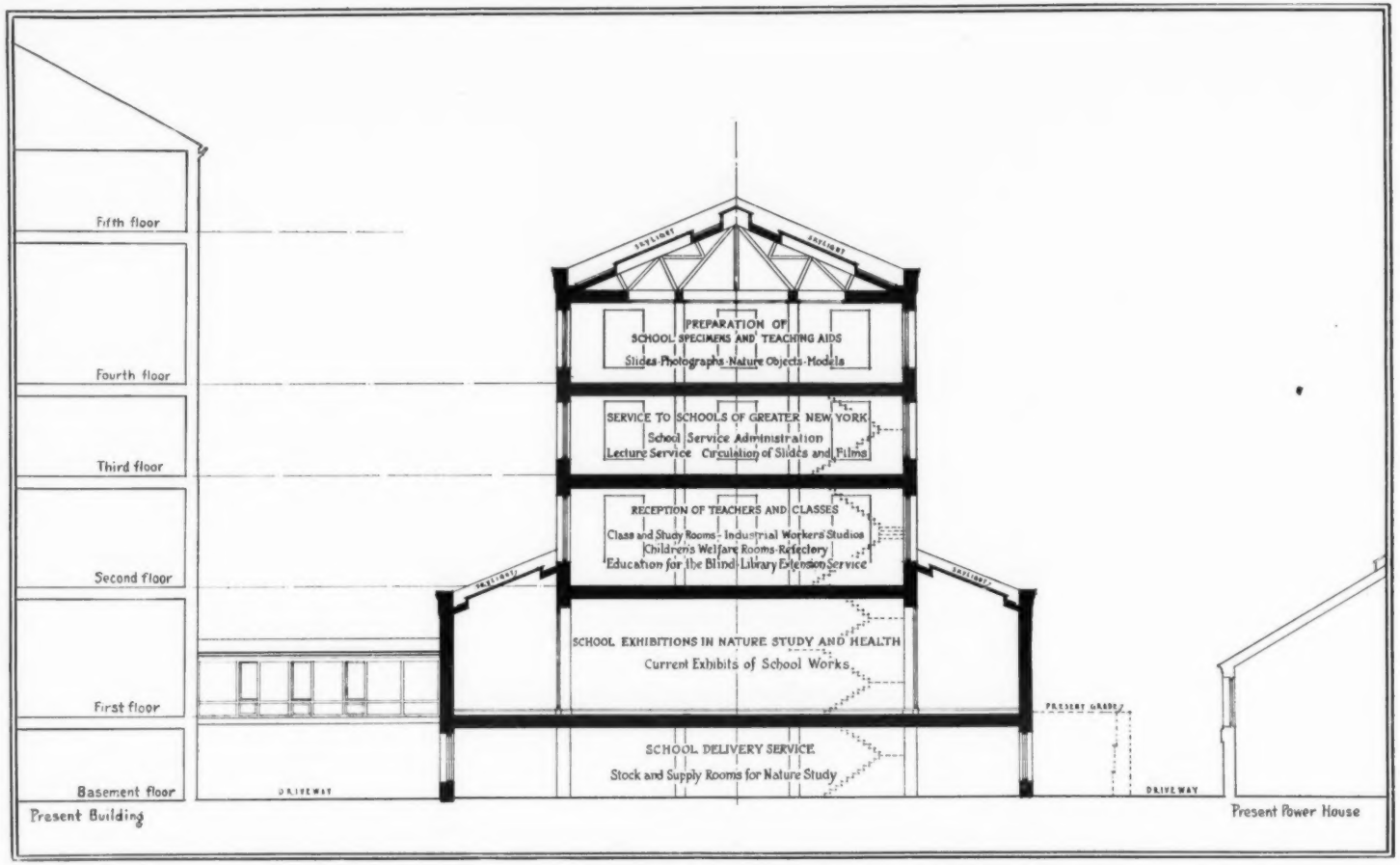
The SCHOOL SERVICE BUILDING is to be located in the southwest court of the Museum. It will be a four story and basement structure, connected by covered bridges on the first and second floors with the north wing on the east and the southwest wing on the west. The basement and first floor will be 160 x 88 feet, and the second, third, and fourth floors will be 160 x 53 feet. The height from the basement to the peak will be 91 feet and the cubical space approximately 1,000,000 feet.

In the basement will be housed the school delivery service and here will be the stock and supply rooms for the nature collections which are loaned to the schools. Coat rooms to meet the needs of 500 pupils will also be located in the basement. This will still leave considerable space for the storage of cast molds and study material used in making the exhibits in the Museum.

The first floor will comprise a large, open central hall 160 x 52 feet with a series of alcoves 18 feet deep along the sides. In the alcoves are to be displayed the food and public health exhibits, which have been so well prepared under the direction of Honorary Curator C.-E. A. Winslow. These exhibits are especially valuable for instruction in civic biology and applied science. The central hall is planned primarily for temporary exhibitions of special interest to schools or to the general public,—such an exhibition, for example, as the flower show, prepared in 1921 under the auspices of the New York Biological Teachers Association, exhibits of posters and other school work, or exhibits of current interest, such as the annual flower show of the New York Horticultural Society or the radium exhibit held at the time Madame Curie visited this country.

The second floor will be given over to the reception of teachers and classes visiting the Museum. Its use for such purposes will fill a long-felt need in the Museum. At the present time it often becomes necessary to close off an exhibition hall in order to provide accommodation for visiting classes. On the second floor as planned will be found class and study rooms, a refectory where light school lunches may be served, and several lecture rooms. A special feature will be rooms equipped for industrial workers in art and design. In this way the Museum's rare material will become the inspiration of practical craftsmen. The education for the blind and the Museum extension service to the libraries will be provided for on this floor.

The third floor will be devoted to the activities connected with the Museum service in the schools. The offices for school service administration will be on



TRANSVERSE SECTION OF THE SCHOOL SERVICE BUILDING, AMERICAN MUSEUM

this floor. Here, too, will be the Museum's library of lantern slides, now numbering more than 35,000, which are loaned to the public schools of the city. At one end of the library will be the slide librarian's office and the shipping and receiving room for the distribution of slides. An important feature will be the teachers' consultation room with sample projection room adjoining. This consultation room will be equipped with tables, each having a ground glass top illuminated underneath with electric light for the use of teachers in selecting and assembling slides for lectures. A practise lecture may then be given in the projection room adjoining. This will be especially valuable to the student teachers from the training schools. On this floor there will be also a school library and teachers' reading room, connecting with a room in which will be displayed typical exhibits that will show at a glance the facilities of this character that the Museum offers.

The fourth floor is to be practically the school laboratory and will provide for the preparation of specimens for schools and other teaching aids. There will be a large photographic studio for the production of slides and pictures, a motion picture laboratory for studying and editing films, a room for coloring slides, and a study projection room with motion picture projector and stereopticon. This floor will also contain the library of negatives and photographs, numbering about 60,000, which is the principal source of the slides for lectures. The library of electros and blocks used in the Museum publications will be stored here.

It is estimated that from 3000 to 5000 children daily may be properly taken care of in the SCHOOL SERVICE BUILDING, or from ten to twenty times the number that the present facilities of the Museum will permit.

How highly the educational service of the Museum is estimated may be inferred from a reading of the following Resolution adopted by the Board of Superintendents of the Board of Education of New York City on March 27 by way of endorsement of the application of the American Museum for funds for the SCHOOL SERVICE BUILDING:

WHEREAS, The American Museum of Natural History since 1881 has been conducting educational work with teachers, and since 1904 has been supplying the public schools of The City of New York with lectures and with nature-study material of all kinds, with lantern slides and other visual education aids in teaching geography, history and natural science; and

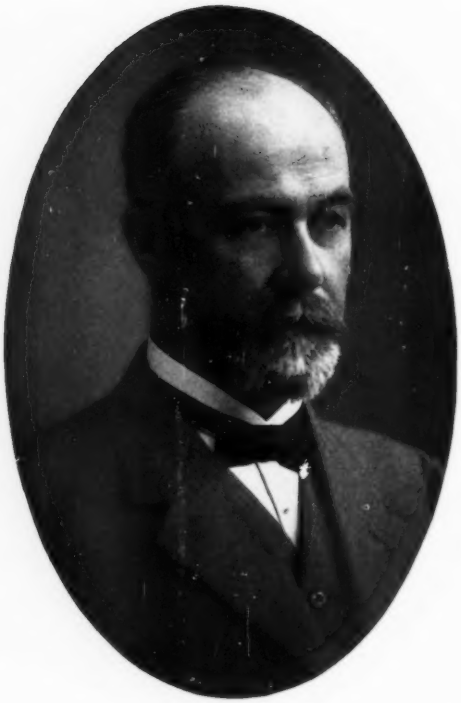
WHEREAS, The American Museum, entirely at the expense of the Trustees, through its explorations in all parts of the world, is bringing to New York rare and valuable educational specimens which are made freely available for the use of the teachers of the City; and

WHEREAS, The Museum is lacking in adequate facilities for receiving the school children who visit the Museum and for housing the administrative work connected with its coöperation with the public school system of the City, and has therefore made application to the Board of Estimate and Apportionment for the appropriation of $570,000 for the erection of a four-story School Service Building in the southwest court of the American Museum of Natural History;

Resolved, That the Board of Superintendents of the Board of Education of The City of New York desires to record its unreserved approval of the valuable service which the American Museum is rendering to the schools of The City of New York, and heartily indorses the plans of the Trustees for making it more thorough and effective, and hereby recommends to the Board of Education that it request favorable consideration from the Board of Estimate and Apportionment of the Museum's application for funds to erect and equip the School Service Building.

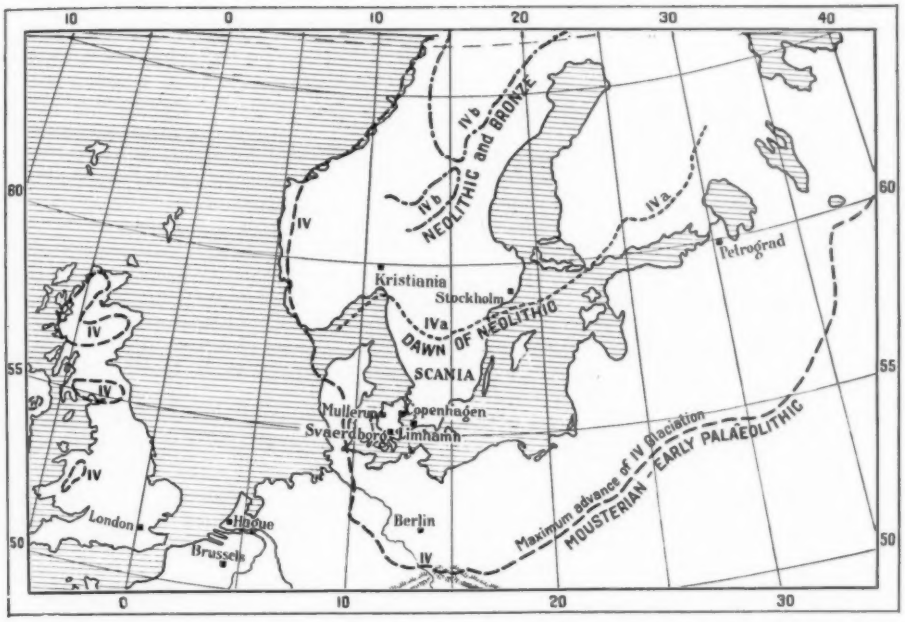
As President Henry Fairfield Osborn has well said, "Education is a great deal more than the three R's: it is inspiration as well as information; it is instruction in local history, in geography and geology, in travel, in climatic laws, in the simple economics of food, in all that concerns personal health of mind and body, in the natural history of flowers, forests, streams, of insects, fishes, birds, and mammals, in all that living nature has to tell our youth." It is this real education that will be advanced by the SCHOOL SERVICE BUILDING.

GEORGE H. SHERWOOD,
Curator of Education,
American Museum.



Gerard De Geer, the leading geologist of Sweden, who has established (1910-1921) the glacial chronology of Scandinavia through the discovery of the clay laminæ

Oscar Montelius, the leading archæologist of Sweden, recently deceased, who established the entire succession of the Neolithic, Bronze, and Iron Age cultures in Sweden, and—shortly before his death—connected the archæology with the glacial chronology of De Geer



Lines of retreat of the final Scandinavian glacial cap which exposed the southern extremity of Scania about 12,000 years ago, contemporaneous with the succession of human industries, namely, early Palæolithic-Mousterian, Neolithic, and Bronze. Lines of glacial retreat after De Geer, drawn by C. A. Reeds

OUR ANCESTORS ARRIVE IN SCANDINAVIA*

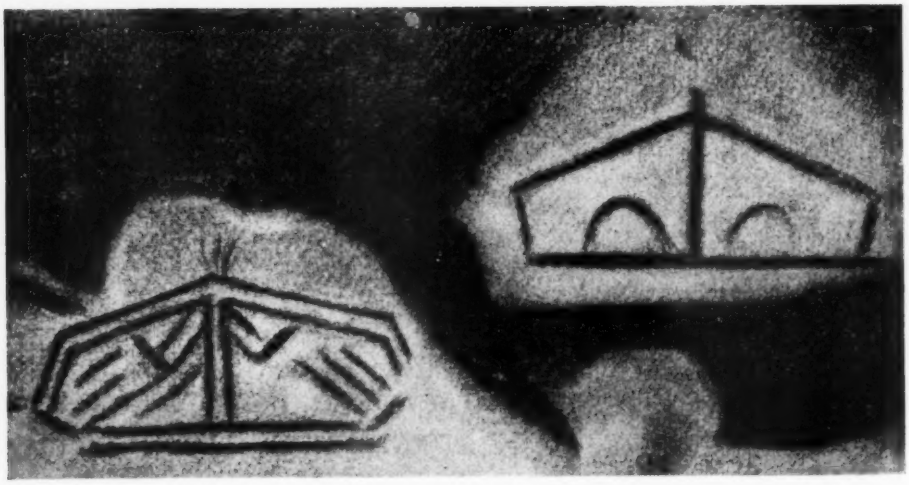
BY

HENRY FAIRFIELD OSBORN

THIS article, the fourth in the series on early man in Europe, covers the eight milleniums of time from the close of the Reindeer Period of the Old Stone Age in Scandinavia to the Age of Bronze, including the dawn of the Neolithic or New Stone Age, now dated at 3500 B. C., when the art of polishing flint and other stone implements reached Scania. It deals with a region which during the early part of the Reindeer Period in France was wholly uninhabitable because it was buried under the ice sheet of the great Scandinavian Glacier.

We shall describe the evolution of the great flint industry known as the Campignian, named after its type station of Campigny, France, an industry especially adapted to the needs of a hardy northern race living in a forested country along river banks or seashores where there could be no recourse to limestone caverns or grottos for shelter. These people built their *cabanes* (huts) partly below the surface of the ground and probably stretched the hides of animals over arched poles in building them. Such a style of building—not unlike that still in vogue among the nomadic peoples of Mongolia and northern Siberia, in which the fire is placed in the center of the dwelling and the smoke emerges through an opening in the roof—called for a constant supply of seasoned firewood, while the streams and the inlets

*"Our Ancestors"—Perhaps few people realize how many of the surnames of native-born Americans are, either directly or ultimately, of Scandinavian origin. An instance of this is afforded by both family names of the writer of this article. Osborn is a variant of the Old Norse name 'Asbiorn' = divine bear (O.N. as, divine + biorn, a bear), Anglicized into Osbeorn, Osbern, Osborn = a godlike warrior (O.E. os, a god + be (o)rn, a warrior). Two Osberns are recorded as killed in battle in 1054 A.D. and the name is of common occurrence in the Domesday Book. Sturges (=Sturge's son), the surname on the distaff side, is somewhat obscure in derivation but seems to be related to the O. E. 'sterced' = stern, stout, strong, and perhaps to O. E. 'stearc' = rigid, stern, strong.—EDITOR.



Upper—Tent of a Reindeer Koryak of northern Siberia, supported by poles from within, and covered with reindeer hide.

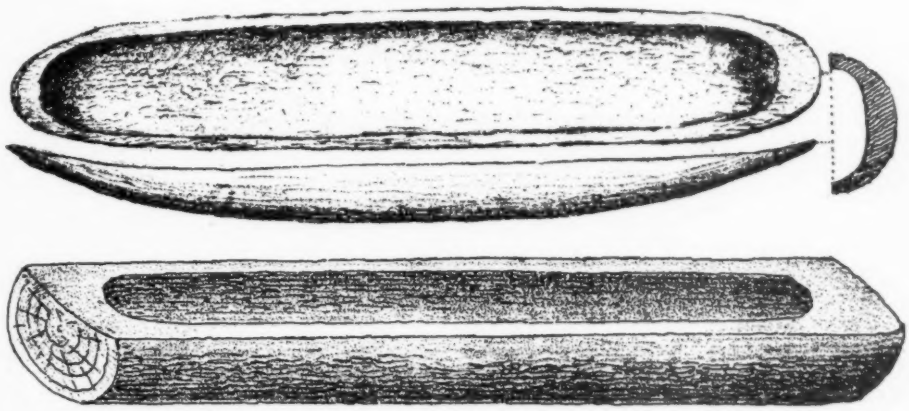
Lower—Drawings believed to represent huts and shelters built of poles and covered with hides, of Magdalenian (Late Palæolithic) age, found on the walls of the cavern of Font-de-Gaume, France. After Breuil

of the adjacent seashores rendered urgent the need of canoes. Whether the log canoe was a western invention, or whether the idea of canoe building came from the east, we cannot be sure; but it may safely be asserted that the flint *tranchet* (prototype of the ax), the flint *pic* (prototype of the pick), possibly the skin-covered *cabane*, and quite probably the log canoe, were brought in as new and striking features of this culture period, and that as early as 7000 B. C. the inhabitants of Denmark possessed implements capable of felling a tree and fashioning a log canoe.

For three reasons this period of eight thousand years is of special interest. First, it witnessed the arrival of our

northern ancestors in northwestern Europe. Second, as the Mesolithic or transition stage, it fills in the interval of prehistory, until recently unknown and mysterious, that lies between the Magdalenian industry of the Crô-Magnon race of artists—that is, the close of the Old Stone Age in Europe—and the dawn of the New Stone Age, characterized by the practice of polishing stone implements, the pursuit of agriculture, and the domestication of animals. Third, it has recently (1910) become possible to assign dates to these industries with greater precision than to the dawn of civilization in central Asia, Mesopotamia, and Egypt. Geology furnishes the chronometer in the seasonal melting of the Scandinavian Glacier with its annual deposits of the fine ice-borne clay by which the years are recorded as distinctly as in the annual ring growths of trees. The discovery that thick clay layers near Stockholm correspond with warm seasons of rapid melting, and thin clay layers with cool seasons of slow melting, suggested to the ingenious mind of Baron Gerard De Geer that here was the long-sought time clock of glacial recession. By the year 1910 he confidently announced a *Geochronology of the Last 12,000 Years* and began a decade of persistent research along the ancient ice-borders of Scandinavia and, more recently, of northeastern America, which has not only confirmed his original theory, but of late[1] apparently promises a means of fixing precisely the date of postglacial time in the northern hemisphere.

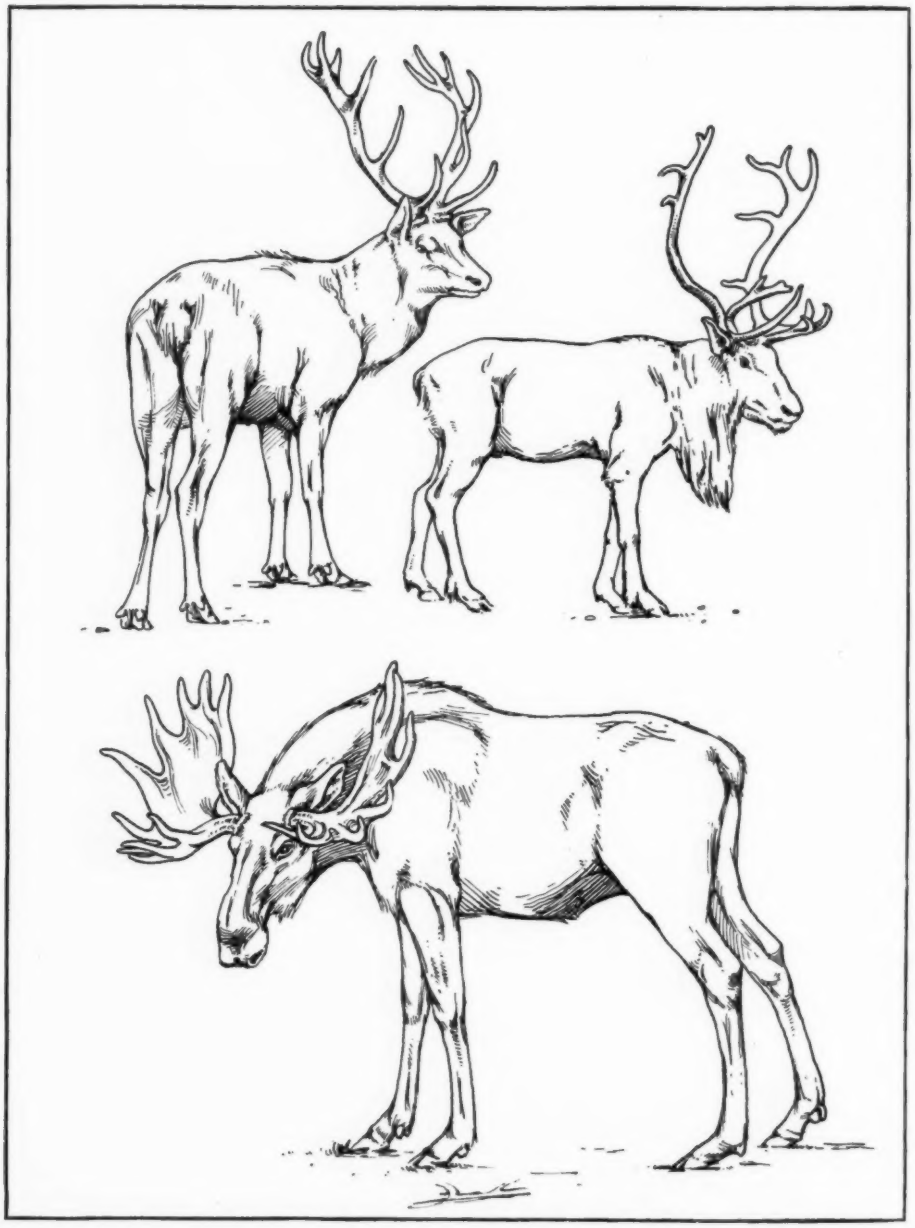
The date when our ancestors arrived in Scandinavia is thereby set by Baron De Geer and by Oscar Montelius,[2] the distinguished archæologist of Scandinavia, as 10,000 B.C. for a conservative minimum and 11,000 B.C. for a maximum. Montelius has also been quick to affix the milleniums of De Geer to his previous subdivisions of the early cultures of Sweden and Denmark and



The prototype of the Viking ship. A number of log canoes are preserved in the museums of Christiania and Stockholm. In the absence of a suitable design from Scandinavia we have selected for illustration two canoes from the Lake Dwellings of Switzerland. After Keller.
Upper—A log canoe from the station of Robenhausen—top view, side view, and cross section
Lower—A primitive log canoe or 'dugout' from Möringen

[1]De Geer, Baron Gerard, "Correlation of Late Glacial Annual Clay Varves in North America with the Swedish Time Scale." *Geologiska Föreningens i Stockholm Förhandlingar*, Bd. 43, H. 1-2. January-February, 1921.

[2]Since the inception of this article the writer has learned with deep regret of the death of Dr. Oscar Montelius on November 4, 1921, through which the study of the prehistory of Europe has suffered an irreparable loss. Widely known as the leading archæologist of Scandinavia, he was for more than fifty years a constant contributor to the scientific journals of his own and other European countries—being an accomplished linguist—as well as the author of numerous books. In addition he was for many years director of the National Museum of Sweden, an office which he recently resigned in order to complete a series of monographs on the unique collections assembled there. The present article owes much to his help and warm personal interest.



The three great game animals of western Europe, which migrated southward before the advancing cold, and returned northward following the retreating ice. All of the same relative size.

The REINDEER migrated southward to the Pyrenees in time of maximum cold, and then slowly retreated northward to southern Scandinavia about 11,000 B. C.

The MOOSE (Scandinavian Elk) wandered southward into northern Spain during the period of maximum cold and retreated northward to Denmark where its bones and horns were used to make weapons and tools in the Maglemose industry of about 7000 B. C.

The STAG, which was depicted by the Magdalenian artists of northern Spain, moved northward, appearing in the early Campignian and Shell Mound deposits of Denmark and Sweden about 5000 B. C.

to propose a series of dates far more precise than those given for any other prehistoric region of the world.

This definite and reliable chronology afforded by the glaciers is doubly welcome because the old divisions of the prehistory of Europe into the Old Stone Age, New Stone Age, Age of Copper, Age of Bronze, and Age of Iron, no longer suffice. They are not only too broad, they are too indefinite, since it is now well known that these cultures overlapped, so that the Old Stone Age of one region corresponds with the New Stone Age of another, and even with the Bronze Age of a third. Not only this overlapping of cultures and industries, but the gradual transitions between these periods—the intermediate stages recently discovered—render a new chronology necessary. This is especially true of the time when our Nordic ancestors arrived in Europe, when the stag had replaced the reindeer all over France and Belgium, and even the moose, or Scandinavian elk, had retreated northward into Denmark, while the reindeer was following the snow fields and retreating ice northward from Denmark into southern Scandinavia.

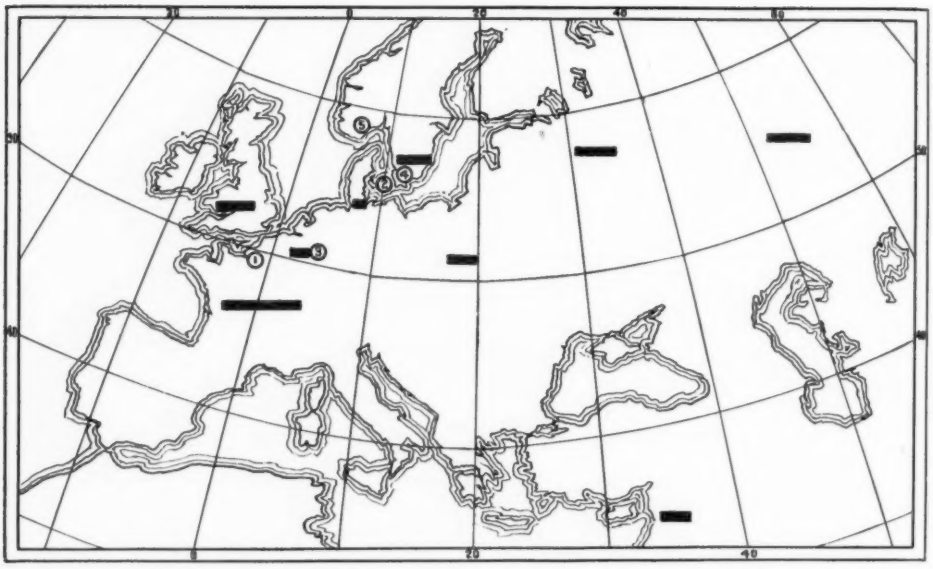
NORTHWARD MIGRATION OF INDUSTRIES

When we realize that the reindeer during the period of high Magdalenian art of the Crô-Magnon race had penetrated Spain south of the Pyrenees and was abundant in the cave region immediately north of the Pyrenees—its hide furnishing clothing; its flesh and marrow bones, food; its horns and leg-bones, weapons and tools—we secure the key to the origin of a variety of human habits and inventions which moved northward twelve hundred miles from Spain to southern Scandinavia. This northward retreat of the reindeer began after the time of the maximum cold of the Fourth Glaciation, and continued for from 8,000 to 10,000 years during the period of the development of the Upper Palæolithic cultures, namely, the Aurignacian, Solutrean, and Magdalenian, and into the minute flint industry of the Tardenoisian.

All the inventions, everything which tended to make life more comfortable, to facilitate the capture of fish or game, moved northward with the hunting tribes. Some of these inventions, like the flint hide-dressers and scrapers, date away back to the time when the Piltdown man and the Foxhall man inhabited western Europe. Others, like the bone sharpeners and shapers, finely retouched flint tools, also flint borers used in perforating bone, date back to Aurignacian times when the manufacture of bone implements began to flourish. Still others, like the minute geometric flints known as Tardenoisian, which may have been introduced from Africa, date only from the Stag Period, which was post-Magdalenian. It is wonderful to find these tiny flints—as pointed out to the writer by Dr. Hamal-Nandrin of Liége—in fishing stations of the very late Reindeer Period of the north, and again at a time when the moose and reindeer had deserted the station of the Grotte de Martin-Rive, and the stag had replaced the reindeer.

The one industry which did not follow the reindeer north was that of the Aurignacian and Magdalenian artists and sculptors of the Crô-Magnon race, and this was left behind because it was not useful or essential to the daily life or food supply of people who were too much occupied with the struggle for existence to develop the æsthetic, or spiritual, side of their nature. Like the American pioneers these Scandinavian people had no leisure for art: they were too busy with fishing, hunting, tent making, and boat building. Nevertheless the art spirit was in them, although latent, and we find it asserting itself about 2000 B.C., as evidenced by most beautiful designs in bronze implements and ornaments made about that time.

It is in the extreme north, close to the retreating ice sheet, that, through the genius of Baron De Geer, we are enabled



Geographic distribution of Campignian industry as given by Salmon, d'Ault du Mesnil, and Capitan in 1898, to which the following sites (indicated by numbers in circles) have been added.

1—Campigny, France, type station of the Campignian culture.

2—Mullerup (Maglemose), type station of the Maglemose culture, and Sværdborg, where extensive industrial remains of Maglemose type have been discovered.

3—Region of extensive Campignian quarries in Belgium, explored by M. Hamal-Nandrin and others

4—General region on the southeastern coast of Scania, Sweden, where Campignian implements are found.

5—Campignian outposts of Norway.

to assign exact dates, not only to the successive northward migrations of reindeer, moose, and stag, but to the corresponding waves of human invention and human migration; and to the interchange of weapons of the chase and tools of successive industries. Oscar Montelius—leader of Swedish archæology and close friend of the leader of Swedish geology, Baron De Geer—has himself given us for NATURAL HISTORY the prehistoric milleniums of Scandinavia.

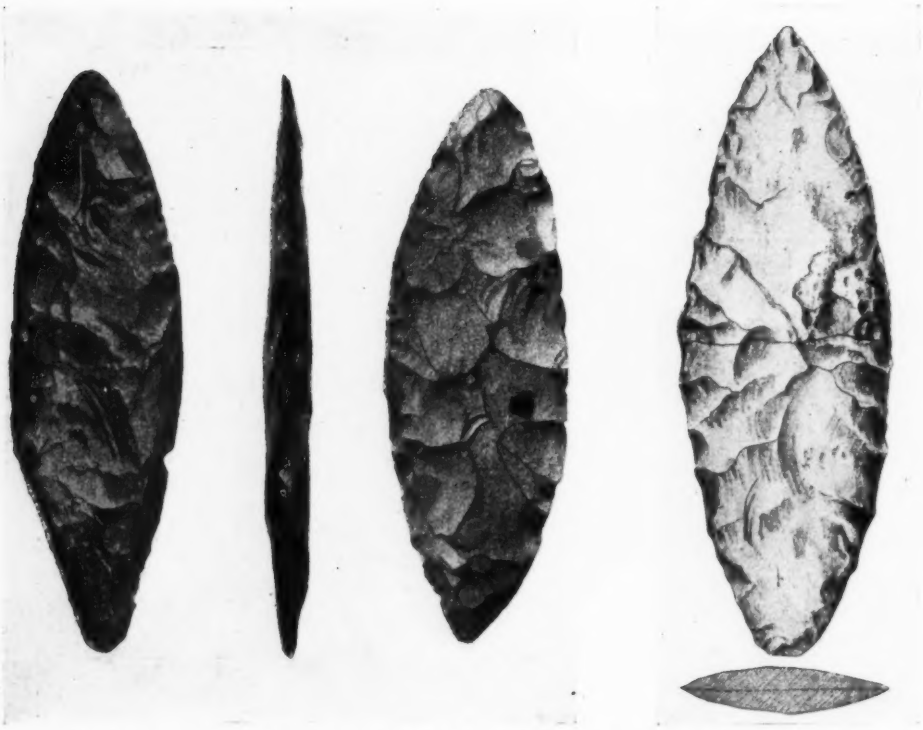
REINDEER PERIOD OF SWEDEN AND DENMARK

(12,000?) 10,000–8000 B.C.

The Reindeer Period of Sweden and Denmark was, as shown in the above table, subsequent to the Reindeer Period of southern France. The southern border of the great Scandinavian Glacier had retreated northward, so that the ice front was not far from the present site of Stockholm, which at that time was depressed more than six hundred feet below the present sea level. A small mollusk, *Yoldia arctica*—partial to icy currents—was flourishing along the eastern shores of Scania, and ice-loving seabirds were migrating eastward and westward over Scania and Finland. Following their favorite game the hardy hunters of the reindeer invaded this country with giant flint implements of archaic type, which remind us of the great stone hand axes of the Old Stone Age although they are retouched about the borders with the deftness of Solutrean workmanship. Such implements are very rare and are chiefly of amygdaloid (almond-like) form—a form which harks back to Chellean times. According to Montelius these implements are of the same age as, or perhaps a little

CHRONOLOGY OF SCANDINAVIAN CULTURES

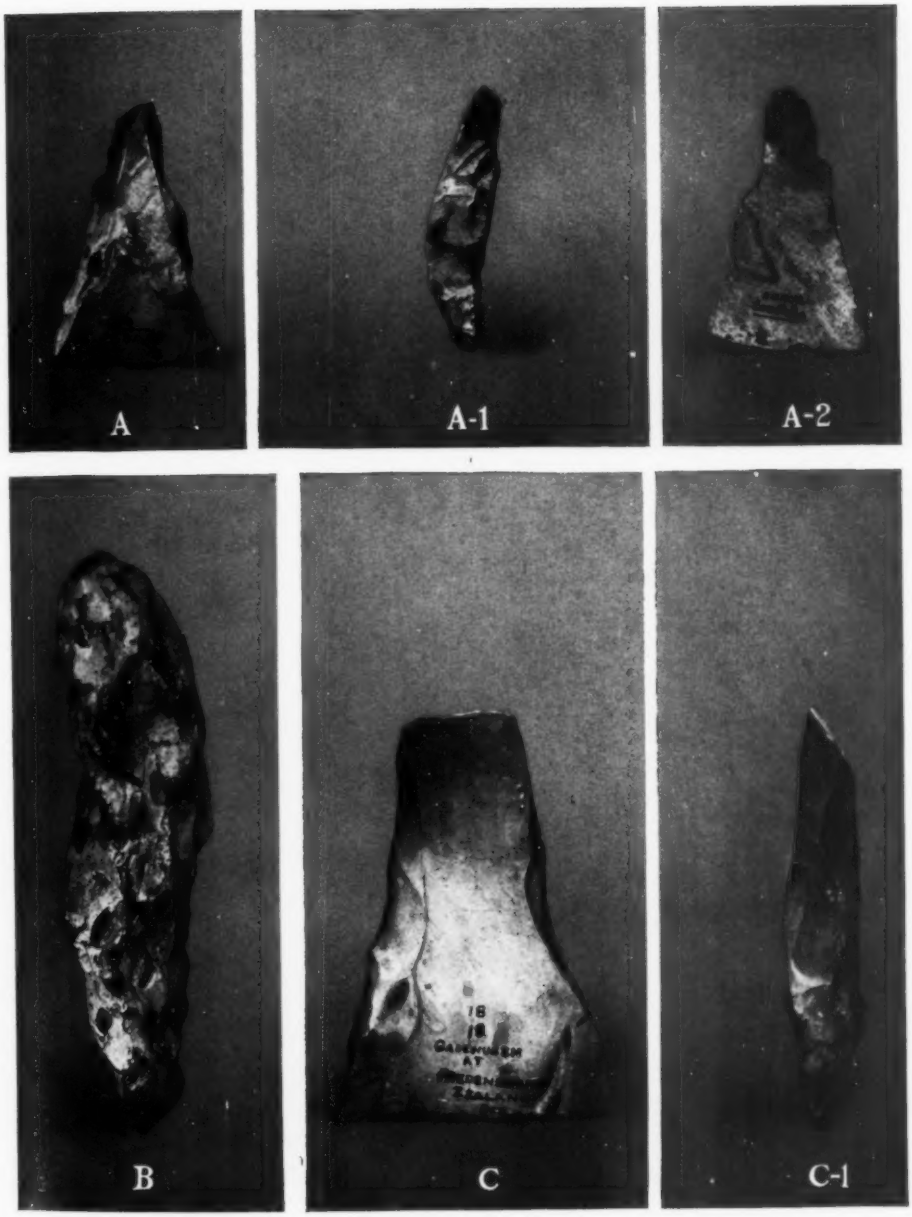
Approximate chronology of the Palæolithic, Neolithic, Copper, and Bronze cultures of western Asia and Europe. These dates are largely conjectural and may be greatly modified by future discoveries.	B. C.	Archæologic chronology of southern Scandinavia as given to the author by Oscar Montelius in the summer of 1921, slightly modified by the more recent determinations of De Geer and Antevs that the ice retreated from central Scania not earlier than 11,500 B. C.
AGE OF BRONZE in central Europe, France, Spain HORSE domesticated in the Orient	2000	AGE OF BRONZE
	2200–1700	STONE CISTS. Inferior pottery. First appearance of BRONZE in Sweden
COPPER used in central Europe and France AGE OF BRONZE in Troy, Greece, and Sicily.	2500	PASSAGE GRAVES. Painted pottery. First appearance of COPPER
AGE OF BRONZE in Egypt and Chaldea COPPER used in Troy, Greece, Sicily, Hungary, and Spain.	3000	Earliest Scandinavian SKULL of NORDIC type DOLMENS—round or rectangular
COPPER used at Anau, Turkestan	4000	Dawn of the NEOLITHIC. No Megalithic tombs. Stone axes developed from *pic*.
COPPER used in Egypt and Chaldea	5000	SHELL MOUND and CAMPIGNIAN cultures. STAG PERIOD
	6000	
	7000	MAGLEMOSE (Mullerup) culture of Denmark—DOMESTIC DOG
CAMPIGNIAN culture in France NEOLITHIC culture at Anau, Turkestan	8000	MOOSE (ELK) PERIOD in Scania
	9000	
	10,000	OUR ANCESTORS ARRIVE IN SCANDINAVIA with large flint implements and axes of reindeer horn
Close of REINDEER PERIOD in southern France.	11,000	REINDEER PERIOD in Scania
	11,500	Final retreat of the Scandinavian Glacier from southern Scania
Crete settled	12,000	
	13,000	
	14,000	
	15,000	
MAGDALENIAN (Palæolithic) culture in France NEOLITHIC culture at Susa, Persia	16,000	
	17,000	
Beginning of NEOLITHIC in southwestern Asia	18,000	



Survival of the laurel-leaf point (*feuille de laurier*) type derived from the Solutrean (Late Palæolithic) culture of western Europe, copied and imitated—doubtless for purposes of the chase—and included in Swedish Neolithic burials. One third actual size. After Montelius

more recent than the clubs of reindeer horn from Denmark, which are among the most precious exhibits of the Copenhagen Museum. Two of these have a hollowed groove in which a flint flake was inserted. A single arrow head of flint was also found near one of them.

The branch of the human race to which these reindeer hunters belonged has not yet been satisfactorily demonstrated, but in the opinion of Montelius it is quite probable that they were true Scandinavians of Nordic type,—a type of which Montelius himself was such a fine example. To quote Montelius freely the ice began to melt and to retire from the southern coast of Scania more than thirteen thousand years ago (11,500 B.C.), whereupon plants and animals migrated there and with them came man. Among the flint implements found in Scania are two closely resembling the double-pointed laurel-leaf type characteristic of the Solutrean of France. Such forms occur only near the southern and western coasts of Norway and Sweden, which were the first to become ice-free. In Denmark also a flint spearhead has been found which resembles the Solutrean form. Montelius holds that these flints demonstrate the presence of man in Scandinavia during Solutrean times, and concludes that the reindeer hunters of Scania belonged to the Crô-Magnon race—an opinion which the present writer is not inclined to accept, since it seems far more probable that the first reindeer hunters in Scandinavia were fair-haired ancestors of the existing Scandinavian races. It is certain that the first races migrating into Sweden were long-headed, and the earliest human skeletons and skulls well enough preserved to be studied are in the main

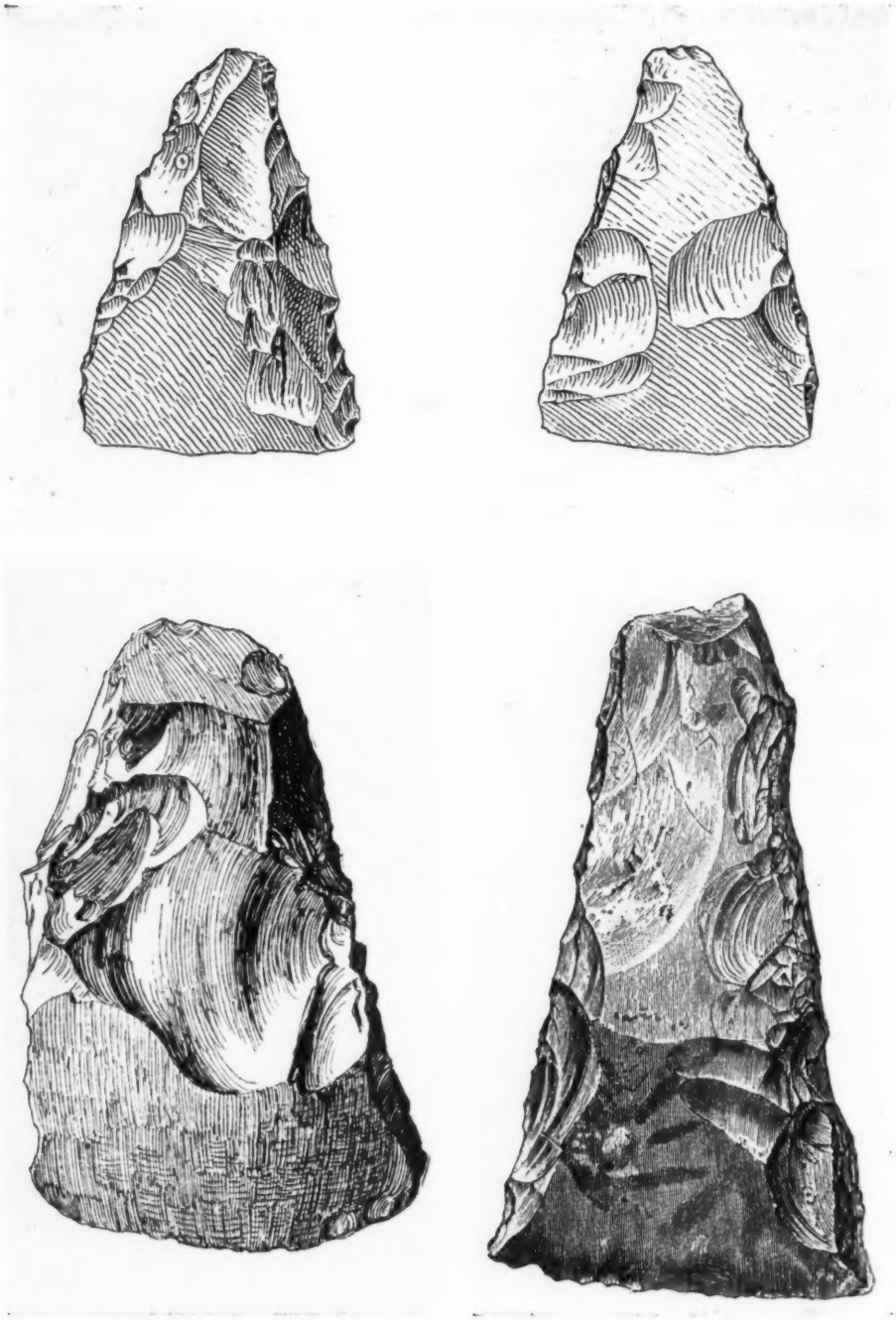


Prototypes of ax and pick, our pioneer implements. The *tranchet* and the *pic*, as they were fashioned at Campigny, France, and later in Scandinavia from specimens in the American Museum of Natural History. All one half actual size.

A, A-1, A-2—*Tranchet* from Campigny, showing both faces and one side view

B—*Pic* from Campigny

C, C-1—*Tranchet* from Sweden, showing one face and one side view



The flint ax of the primitive Scandinavian forester and woodsman, as it evolved from the typical flint *tranchet* of Campigny, France. All actual size.

Upper two—*Tranchet* from Campigny, France. After Salmon, d'Ault du Mesnil, and Capitan
Lower left—*Tranchet* from Sværdborg, Denmark. After Friis Johansen
Lower right—*Tranchet* from Sweden. After Oscar Montelius

dolichocephalic, the oldest dating back to 3000 B.C. in the chronology of Montelius. There is no evidence of the occurrence of the broad-cheeked Crô-Magnon type of late Palæolithic Age in the oldest Scandinavian graves.

THE MOOSE PERIOD IN SWEDEN AND DENMARK 8000–5000 B.C.

MAGLEMOSE (MULLERUP) CULTURE OF DENMARK

The reindeer followed the ice sheet northward and was succeeded by the moose, which was so abundant in Denmark that it dominated the industrial as well as the hunting life. This was the period known to geologists as the Ancylus Time, when Scandinavia united with Denmark and Finland, shutting out the North Sea and the Arctic Ocean and thus converting the Baltic into a great fresh-water lake. For archæologists this time is characterized by the industry of the Peat Bog (Maglemose) near Mullerup—a name derived from the peat bed in Denmark where a dwelling was discovered and excavated by Sarauw in 1903. Sarauw thought that the people lived on rafts or floats—an error, since it is now known that they dwelt on very low islands or lake borders, a fact brought out in the neighboring peat station of Sværdborg, described by Johansen in 1919.[1]

The fact that we have now left the Reindeer Period and the Old Stone Age of Europe and are witnessing the dawn of the transitional or Mesolithic, leading to the New Stone Age, is clearly established by the absence of any trace of pottery and by the first appearance of two implements which are entirely new in the industrial prehistory of Europe. These are the *tranchet* and the *pic*. Crude as they are, the *tranchet* and the *pic* represent two inventions new to this part of Europe which are destined to be of transcendent importance to the human race, and which relate Maglemose and Sværdborg to the industry of Campigny, France, about 560 miles to the southwest.

The low coasts of Denmark were ill supplied with native flint, and it is by no means impossible that the few *tranchets* and *pics* may have come by trade from some of the rich flint quarries of Belgium or France, in which the Campignian industry had formerly flourished.

The Maglemose and Sværdborg workers were favored by the abundance of moose, stag, roe, and wild cattle (*Alces machlis, Cervus elaphus, Cervus capreolus, Bos taurus*), which richly compensated them for the paucity of flint. They manufactured bone tools of every kind, especially for their clothing industry—hide dressers, polishers, scrapers—and for the more serious work of the chase they inserted their cutting and piercing flints in bone hafts and handles. A brief survey of the splendid collection from Sværdborg in the Copenhagen Museum reveals sixteen kinds of bone implements and flint holders, fashioned chiefly from the hard horns of the stag and of the roe, including two kinds of harpoons with a single row of barbs, two kinds of bone lances, and many kinds of hafts. To fashion these bone tools there survived from the earlier Old Stone Age thirteen varieties of flint tools—scrapers, points, borers, and hammer-stones, as well as innumerable delicately pointed and dressed flint flakes, which were doubtless set in single or double rows in bone or wooden harpoons, as shown in the illustration on p.128, reproduced from Montelius.

With these numerous survivals of flint implements of the Old Stone Age there appear a few examples of the two new forms—*tranchets* and *pics*—and these are by no means well made. We may be sure that these distinctively Campignian implements were not greatly needed by the people of the Sværdborg and Maglemose region, for they had only just begun to fell the trees, hew the logs, and dig out the log canoes after the manner of the forest-loving, boat-building people of Scania. In Sweden there are

[1] Friis Johansen, Karl. En boplads fra den aldste stenalder i Sværdborg Mose. Aarböger f. nord. Oldkyndighed, 1919.

a few peat-bog stations of a similar culture with harpoons cut out of the ribs of the moose instead of the stag, and with microlithic flints, probably from dwellings on small islands in the lakes. In Denmark the game associated with this culture included, besides the large ruminants, the wild boar, the brown bear, the beaver, and the wild cat. At all these peat stations only one domestic animal is found—the dog, *Canis familiaris*, harbinger of the art of domesticating animals.

THE SHELL MOUND PERIOD OF DENMARK

A CULTURE SIMILAR TO THE FULL CAMPIGNIAN OF BELGIUM AND FRANCE. 5000–3500 B.C.

The moose has now well nigh disappeared from Denmark and southern Sweden, and with it the pine forests, so abundant in Maglemose times, a bird associated with the pine forest, the capercaillie (*Tetrao urogallus*) is no longer included in the fauna. This is the Age of the Stag (*Cervus elaphus*) and the moose is very rare except possibly in the winter season. Climatic conditions are much changed because we are now in what geologists call the Littorina Period of renewed continental depression. Since the periwinkle (*Littorina*), after which this period is named, is a salt-water animal, it is clear that the ocean again entered freely through the straits between Denmark and Scania. The Baltic Sea is entirely cleared of ice for the great Scandinavian Glacier has retreated within the shore line and is now in the postglacial stage. From the abundant shell mounds of Denmark—placed near the shores of the Littorina Sea—come four species of shells, namely: the oyster (*Ostrea edulis*), cockle (*Cardium edule*), mussel (*Mytilis edulis*), and dog-whelk (*Nassa reticulata*), besides the edible periwinkle (*Littorina littorea*). No contemporary Shell Mound dwellings have been discovered in Sweden, obviously because the inhabitants preferred the game in which the country abounded to the shellfish diet of the Danish tribes to the south, the only shell mound discovered in Sweden being of Neolithic age.

A typical seaside dwelling of Campignian times in Sweden was that of Limhamn, not far from Malmö and opposite Copenhagen, where we find ourselves in the presence of a fully developed flint industry of the perfected Campignian. Very abundant are the *tranchets* and *pics*, fashioned closely after those found in the typical Campignian station of Campigny, France, about 630 miles to the southwest. Among these flint workers many of the older implements are still in use, as, for instance, knives for cutting flesh, arrow points for the chase, scrapers for hide-dressing, borers for the perforation of eyelet holes and the piercing of skin and bone. The arrows and harpoons of bone—so abundant in the industry of the Maglemose and Sværdborg camps in Denmark—are exceedingly rare or have completely disappeared. It is in-

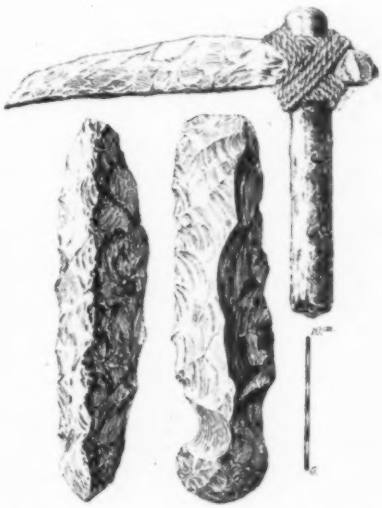
A harpoon made of bone with a double row of barbs, in the Museum of Stockholm, to be compared with the harpoons made of reindeer horn of Magdalenian Age found all over France. One half actual size

A polished Neolithic ax, successor of the Mesolithic *tranchet*, inserted in the leg bone (tibia) of a stag—one of the chief treasures of the Stockholm Museum. Three tenths actual size

teresting to note that these men still barbed their harpoons with Tardenoisian microliths. Beside their fireplaces abundant shards of undecorated pottery are found.

The *tranchet* and the *pic* of this time may be compared with the very primitive forms found at Maglemose and Sværdborg, which in Montelius' chronology are considered from one thousand to two thousand years more ancient. As regards the effectiveness of stone implements, the Danish archæologist, Friis Johansen, made a convincing test by inserting a flint ax-head in a haft and cutting down a tree with it. It is most probable that the *tranchet* was the prototype of the Scandinavian ax or *hache*, the implement of the wood chopper and boat builder; while the *pic* also, inserted in a haft, was useful in shaping the outside and the inside of the primitive log canoe or dugout, and may have developed into the adze of the more modern boat builder. Like the ax, the *tranchet* has a square head, and its successor, the square-headed *hache*—found only in the forested regions of Scandinavia and northern Germany—is the crude *hache* of the Neolithic Dolmen Period.

Each successive industrial period is now marked by the increasing perfection of two dominant implements, the *tranchet* and the *pic*, which first appeared in western Europe in pre-Campignian times but were probably brought from the east. If the *tranchet* was used for wood-cutting, the *pic* was used not only for wood-shaping but also for digging—a service which led to the use of the *pic* in mining, the type of tool so applied being made first of flint and later of metal. It seems reasonable to attribute the dawn of boat building and of mining to this latest stage of the great hunting age of man, when food consisted solely of the flesh of game, fish, or mollusks, and the agri-



A miner's pick from northern Egypt and its manner of attachment. After Jacques de Morgan. Reproduced from Figure 75 of his *L'Humanité préhistorique*, 1921, p. 157. "Pic de mineur de Ouadi el Cheikh (musée de Saint-Germain, récoltes de Seton Karr) et son emmanchement." About three sixteenths actual size

cultural fruits of the earth were still unknown in Scania and Denmark, although several thousands of years previous they were developed in Asia. The art of cooking had been improved by the introduction of pottery from the east, and the chase and recovery of game facilitated by the domestication of the dog. Thus closes the transitional or Mesolithic Age.

DIVISIONS OF THE NEOLITHIC AGE IN DENMARK AND SCANDINAVIA

As we have already seen, the development of prehistoric civilization proceeded very gradually. When our ancestors arrived in Scandinavia, they brought with them an Old Stone Age culture. Then they adopted the *pic* and the *tranchet*—types which in an earlier age were actively manufactured in Belgium and northern France—for Scania was not far from Maglemose in Denmark, where a number of these tools were found. With the arrival of these tools in the north, came also the introduction of the domesticated dog. Similarly, the age of the Shell Mound and of the full Campignian cultures is marked by the introduction of pottery and of improved types of *tranchet* and *pic*. Finally there came the introduction of the art of sharpening the cutting edges of stone implements by rubbing them up and down on a smooth stone. Thus the dawn of Neolithic influence in Sweden is indicated by the polishing of implements which for thousands of years previous had been fashioned by flaking and chipping. By means of the contact established through trade and by word of mouth with the dark-haired, broad-headed peoples living to the south, stage by stage the Neolithic civilization — for such it was — came north. Among domesticated animals, goats, sheep, cattle, and swine appear in Sweden, and finally the horse—an animal destined to play a great part in Swedish mythology. Among grains the introduction of the hardy wheat and rye are followed by that of barley and millet. Finally, a wave of religious influence spreads to the north: sun worship, the idea of immortality, and the pompous ceremonial burials and monuments in honor of the dead.

The main divisions of the Neolithic period in Sweden, as given to the writer by Oscar Montelius,[1] are as follows:

IV. NEOLITHIC 2200–1700 B.C.

This is the acme of both the chipped and the polished flint industry. The flint workers learn to imitate both the forms and shapes obtained by the copper and bronze workers to the south and east.

Superb flint daggers are manufactured with a delicate retouch that far surpasses in beauty that obtained in any other part of Europe. The impulse of an artistic spirit is evident in a number of ceremonial weapons. Among these very finely finished designs in stone are those resembling bronze types—flint daggers in which even the stitching of the leather handles of the bronze weapons is skilfully simulated in flint. All these weapons are doubtless ceremonial.

The battle axes of the period have rather degenerated, and are developed in imitation of the copper types characteristic of Period III. The industrial flint axes retain the same shape as those of Period III—a modified *tranchet* form, thick at the top.

At the same time the elaboration of burial customs begins to be evident. Rectangular stone cists appear—sometimes with a small entrance passage at the gable end. There are also Megalithic burial chambers with an entrance passage, which is always at right angles to the long side of the chamber.

The pottery indicates a marked decadence in design and manufacture.

III. NEOLITHIC 2600–2200 (2100?) B.C.

The stone axes are now smaller in size, thick at the top and expanded at the bottom as if developed out of the *tranchet*.

Excellent pottery is found, resembling that of similar age in Germany and with similar patterns.

II. NEOLITHIC 3000–2600 B.C.

The Scandinavian flint adzes are now very large, finely polished on both sides, and rectangular in section—a type of adze found only in Scandinavia and northern Germany. To this period belongs the adze set in moose horn, one of the treasures of the Stockholm Museum.

The sun worship cult had by this time reached Scandinavia, and the characteristic burial dolmens of round or rectangular form, but without entrance passage, begin to appear.

[1]The result of an ever memorable conference held on August 5, 1921. The writer is especially indebted to Doctor Schnittger, assistant antiquarian in the National Museum of Sweden, for his amplification of the Montelius chronology.

I. NEOLITHIC (4000?) 3500–3000 B.C.

Prevalence of polished and unpolished flint adzes, directly developed from the *pic*, convex or concave in section, pointed at the tip and thus not derived from the *tranchet* type.

The new religion of sun worship had not yet reached Sweden, for there are no Megalithic graves or monuments.

DIVISIONS OF THE BRONZE AGE IN DENMARK AND SCANDINAVIA

During this time trade routes had been established from the southeast Mediterranean region to the northwest. The most coveted object in the Mediterranean islands and the Ægean Sea was amber from the Baltic; and the most coveted objects in the west and northwest were copper and, later, bronze. Many of the actual trade routes have been traced by Montelius until they have become well known to European archæologists.

To the writer, the most striking impression made by the superb collection of prehistoric bronzes in the Stockholm Museum, which he enjoyed observing under the guidance of Montelius, was the surpassing workmanship and the beauty of execution of the fundamental designs which came with the bronze from the distant craftsmen of the eastern Mediterranean to the craftsmen of Scandinavia—from a pure Mediterranean to a pure Nordic race. The most refined methods of bronze casting attained a high degree of perfection among these Nordic workers, in whom the art spirit, which had slumbered so long, was now fully awakened. For example, the method of casting known in France as *à cire perdue* was brought to Scandinavia and was highly developed in the ninth century B.C., about one hundred years before the foundation of Rome. The ornamentation was put on after the casting. The date of 900 B.C. is established by Montelius through finding these Scandinavian bronzes in dated tombs in Italy.

Another achievement of the Swedish craftsmen was the making of collarettes of bronze deeply incised in Mediterranean designs by means of bronze tools. Thus Sweden began to export her works

Flint poniard with a handle, on which has been imitated in flint the stitching of the leather cover of the handle. This poniard, of a design imitating a bronze poniard with its leather handle, executed with a superb flint retouch, is one of the masterpieces of the Stockholm Museum. After Montelius, *Meisterstücke im Museum vaterländischer Altertümer zu Stockholm*, 1913, Heft I, Plate ii. One half actual size

of bronze art at an early period, and the facilities of trade advanced so rapidly that Montelius believes that a pottery design could have been carried in one year from the Mediterranean to Scandinavia, one of the favorite routes being by the Brenner Pass, the River Inn, and the valley of the Danube—a route now followed by modern railways. Probably such routes were used for the interchange of objects of industry long before they were used for the transport of objects of art. New religious ideas and ceremonials probably followed the trade routes. Thus, because of the occurrence of Scandinavian burial monuments in Britain, Montelius believed that he had also proved the existence of a route from Scandinavia across the North Sea to the mouth of the Humber, a route established during the Stone Age, perhaps about 3000 B.C.

PERIOD VI. 550–700 B.C.

Transition to the Age of Iron, which may be called either the last period of the Bronze Age or the first period of the Iron Age.

PERIOD V. 700–900 B.C.

Very thin bronze vessels cast *à cire perdue*, richly decorated, some designs showing the influence of the Mediterranean region. Reversed spirals. Burials with cremation; bones burnt.

PERIOD IV. 900–1100 B.C.

Round, hanging, bronze vessels. Graves, all with incineration.

PERIOD III. 1100–1300 B.C.

Small, round boxes of bronze with star-shaped design. Gold spirals. Necklaces and shawl pins. Graves mostly with incinerated remains.

PERIOD II. 1300–1500 B.C.

High art period of the Scandinavian bronze culture, elegant spiral designs, the workmanship superior to Italian workmanship contemporary with it. Beautiful bronze swords and axes, imitations of bronze axes in stone. The incineration or cremation of bodies in Sweden commenced during this period.

PERIOD I. 1500–1800 B.C.

Mostly simple types, but already displaying remarkable skill in casting, many of them imitating the Stone Age weapons. Evolution of the copper into the bronze ax with increasing economy in the use of this precious alloy of copper and tin. Active trade with England and exchange of axes. Ornamental bronze and gold objects, which are relatively small and rare. Graves with unburnt bodies.

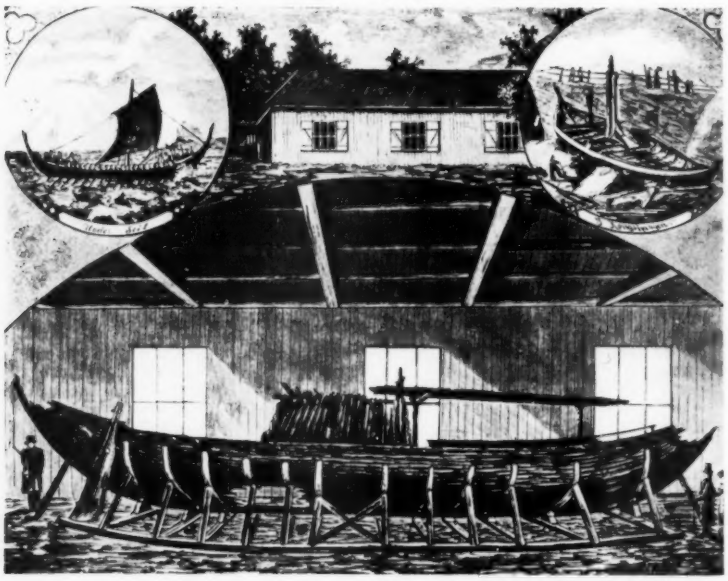
During these six periods bronze was used most sparingly because it had to be imported from other regions, some from the British Isles but the greater part from central Europe. Copper mines were not opened in Sweden until some thousands of years after the end of the Bronze Age, and no tin has been found in Sweden. Perhaps the very rarity of the alloy led to the reverence with which it was regarded and the beauty of design which was developed. Scandinavians were acquainted with only one other imported metal, namely, gold. Montelius informs us that during the first part of the Bronze Age bodies were buried unburnt in stone cists or in coffins of hollowed-out oak. From the second to the sixth period the bodies were burnt and the incinerated bones were preserved in small cists of stone or wood, or in simple urns of burnt clay. The rock carvings of Sweden tell us much about the life of men in the Bronze Age—of their agriculture, for we see men plowing with oxen; of the chase or war, for we see men on horseback or driving; of navigation, for we see ships without masts or sails but manned with large crews; of religion, for we see the sacred wheel, the symbol of the sun god.

In closing, let us glance once more at the table (p. 123) in which we have summarized the conclusions of Montelius in regard to the archæology of Scandinavia—from the time when our ancestors arrived in that region to the Age of Bronze—set side by side with the geologic chronology of his friend and colleague, De Geer. In this table it becomes apparent that what the far-distant northwest was to our American pioneers, what *ultima Thule* was to ancient historic times, such was Scandinavia to the peoples of the Mediterranean borders. In the course of thousands of

Bronze bowl and bronze collarette—two of the most beautiful objects in the Stockholm Museum—decorated with the incised spiral designs which Montelius believed to be derived from Mycenæan motifs. Reproduced from Montelius' *Meisterstücke im Museum vaterländischer Altertümer zu Stockholm*, 1913, Heft I, Plates v and vi

years implements, symbols, and inventions—useful, religious, or artistic—slowly found their way westward and northward; from eastern Asia to Sweden, a distance which, thanks to the telephone, is today spanned in a few seconds. For example, copper is said to have been used at Anau, Turkestan, about 4000 B.C., and first appears in Scandinavia 1500 years later—namely, 2500 B.C. The Age of Bronze, which was in full sway in Egypt and Chaldea by 3000 B.C., makes its first appearance in Sweden eight hundred years later.

Thus within a period of eight thousand years our ancestors arrived in Scandinavia and passed through a long hunting stage of evolution with only flint implements; through all the Neolithic phases; through a superb development both of the art of flint and of bronze; into the culminating period of the Age of Iron.



Courtesy of Dr. M. C. Ihlseng

The Viking ship, which was discovered—together with weapons and other relics—in the 'blue clay' deposits at Gokstad, Norway, and is now in the museum of the University of Kristiania

Right insert: Discovery site. Left insert: Restoration

"THE PASSING OF THE GREAT RACE"—A REVIEW*

BY

WILLIAM K. GREGORY[1]

FOR many years past the potent labors of Mr. Madison Grant have contributed widely to arouse his fellow countrymen to well-organized efforts, in order to save from extermination the bison, the giant redwood, and other noble products of American evolution. Similarly in *The Passing of the Great Race* he calls upon them to defend and conserve what he regards as the greatest of all human races (the Nordic), which has been long decimated by fratricidal wars and weakened by race mixtures and is now being rapidly outbred by hordes of immigrants from southeastern Europe and Asia. Simply by its own inherent force this book has stimulated anthropological investigation, aroused widespread interest in the subject of race, and given a powerful impetus to the eugenics movement in this country and abroad; finally it has unquestionably influenced the Congress of the United States, which has recently adopted restrictive measures against indiscriminate immigration.

In the earlier editions of this work even the favorably disposed reader could not escape the impression that it was too largely an *ex parte* statement of the case. A surprisingly large number of far-reaching generalizations were made with scant indication of the evidence upon which they rested. Of the Mediterranean race, for example, it was said: "The mental characteristics of the Mediterranean race are well known, and this race, while inferior in bodily stamina to both the Nordic and the Alpine, is probably the superior of both, certainly of the Alpine, in intellectual attainments. In the field of art its superiority to both the other European races is unquestioned, although in literature and in scientific research and discovery the Nordics far excel it." The Alpine race received slight consideration, as a race of peasants and tillers of the soil, everywhere exploited and organized by the Nordics. To the Nordic race was attributed a great preëminence in personal prowess, in leadership, in military genius, in chivalry, gentleness, and nobility. No doubt those who were familiar with Ripley's *The Races of Europe*, were not altogether unprepared for these conclusions, but in default of more detailed evidence for the assertions made it was easy for the skeptic to dismiss *The Passing of the Great Race*, while those who deny the predominant part of heredity in human behavior and attribute everything to environment remained outwardly unmoved by the author's *tour de force*.

Thus both the defenders and the critics of the book joined in a demand for authorities, for a more detailed presentation of the evidence. The addition of a lengthy documentary supplement to the fourth revised edition, and the expansion of the bibliography and of the excellent index, go far toward meeting this legitimate demand, and will add greatly to the authority and reputation of the work.

This documentary supplement, together with the bibliography and index, comprises some 201 pages as compared with 273 pages occupied by the text; it therefore nearly doubles the size of the work and for the first time enables the general reader to form an independent judgment as to the validity of the author's conclusions. The fullness of the index may be judged from the fact that

**The Passing of the Great Race or The Racial Basis of European History*, by Madison Grant; Fourth Revised Edition; with a Documentary Supplement. With Prefaces by Henry Fairfield Osborn. Charles Scribner's Sons, New York, 1921. pp. i-xxxiii, 1-476.

[1]Curator of Comparative Anatomy, American Museum, Secretary of the Galton Society.

under "Alpine race" we find about 160 carefully classified references, and under "Nordic" about 3 columns.

A few examples of the way in which statements in the text are supported by citations of authorities in the documentary supplement may now be given. On page 158 of the text we find the following statement: "In Greece the Mediterranean Pelasgians speaking a non-Aryan tongue were conquered by the Nordic Achæans." In the documentary supplement we find more than two pages of citations and authorities in support of the assertion that the Pelasgians were Mediterraneans and the conquering Achæans Nordics. The indirect evidence that Pelasgian was a non-Aryan tongue is also given. Incidentally the author's statement (p. 160) that the splendid civilization of Hellas was due to a fusion of the two elements, the Achæan and Hellene of Nordic and the Pelasgian of Mediterranean race, is not inconsistent with his contention that sooner or later the "lower" race will outbreed and replace the "higher."

The author pays special attention to the Aryan-speaking invaders of India, who introduced and imposed their language upon the Anaryan and largely Mediterranean aborigines. He cites authorities tending to show that the Sacæ, who invaded India, were a blond race that has left distinct traces among the modern Tadjiks; that they were also related to the Aryan-speaking, dolichocephalic blonds who invaded Persia and organized the Persian empire.

The author carefully analyzes a great deal of historical data in support of his conclusion that the primitive home of the Nordics was the grasslands and steppes of Russia, extending north of the Caucasus Mountains and the Caspian Sea to ancient Bactria, now Turkestan, and that later the Nordics spread westward into Europe, south into Persia, southeast into India, and even as far east as Mongolia. He is at great pains to identify the primitive Nordics with the Proto-Aryans and to show that the great diversity of the Aryan languages is partly due to their being imposed by Nordics upon Alpines and Mediterraneans originally speaking Anaryan tongues. His notes upon the Neolithic age and upon the Bronze and Iron cultures are especially full and detailed. He identifies the Bronze culture with the Alpines, who spread widely over central Europe and were in turn overlaid by the expanding Nordics. The latter in early historic times appropriated the use of iron from Alpine Hittites (p. 129): "Bronze weapons and the later iron ones proved in the hands of these northern barbarians to be of terrible effectiveness. With these metal swords in their grasp, the Nordics conquered the Alpines of central Europe and then suddenly entered the ancient world as raiders and destroyers of cities. The classic civilization of the northern coasts of the Mediterranean Sea fell, one after another, before the 'Furor Normanorum,' just as two thousand years later the provinces of Rome were devastated by the last great flood of the Nordics from beyond the Alps." (Pp. 129, 130).

But the Alpines and the Mediterraneans are now having their revenge. "The resurgence of inferior races and classes throughout not merely Europe but the world is evident in every dispatch from Egypt, Ireland, Poland, Rumania, India, and Mexico. It is called nationalism, patriotism, freedom and other high-sounding names, but it is everywhere the phenomenon of the long-suppressed, conquered, servile classes rising against the master race." (p. xxxi). In this case the danger, the author concludes, is from within and not from without. "Neither the black, nor the brown, nor the yellow, nor the red, will conquer the white in battle. But if the valuable elements in the Nordic race mix with inferior strains or die out through race suicide, then the citadel of civilization will fall for mere lack of defenders."

NATURE AS THE UNIVERSAL TEACHER

BY
THORNTON W. BURGESS

NATURE was the first teacher of the human race. With this statement no one can take issue. It was not until our prehistoric ancestors began to observe the workings of nature and tried to discover the laws governing the manifestations which they observed, that they began to rise above the animals surrounding them. Every upward step since is traceable directly to increased knowledge of the laws governing life, and these laws are the laws of nature and have existed from the beginning. Nature was the first teacher and still is the universal teacher.

This being true, it seems to me a fatal defect in our present educational systems that nature study is given so small a part. In the curriculum of the average public school nature study has such a minor place that it becomes almost negligible. Yet it should be the foundation on which the educational system is based.

This statement is broad and I am aware that it is likely to be vigorously challenged. Nevertheless, in my own mind there is not a shadow of doubt that it is true. I make the statement out of an extended experience as a writer of nature stories for children, an experience which is constantly driving home to me the fact that in the study of nature lies the key to the most successful mental, moral, and spiritual development of the child.

When I began writing animal stories for children, it was with the sole purpose of teaching the facts about the forms of animal life most familiar to American children. I endeavored to do this by stimulating the imagination, which is the birthright of every child, at the same time holding absolutely to the truth so far as the facts concerning the subject of each story were concerned. As the stories grew in number, surprising discoveries were made.

The first of these was the universal interest in animals and birds. It is not confined to children. I question if there is another subject which can even approach animal life in universal appeal to young and old. Whether the child be of the country or the city, he or she is at once interested by animals. This interest is instinctive. It goes back to the day of the "dawn man." By force of circumstances his sole interest in life must have been in the animals and other creatures surrounding him. His very existence depended on constant observation of them. Such intelligence as he had was constantly concerned with them. The larger forms were an ever present menace to his existence and the lesser forms were his chief source of food supply. This interest has persisted ever since, and probably always will persist.

The second discovery was that nature study is unequaled as a vehicle for conveying information of all kinds. The driest of facts if embedded in a nature story written so as to appeal to the imagination will not only be unhesitatingly accepted but will be permanently retained. Let me illustrate.

During the war when the thrift and war savings stamps were introduced, I was appealed to by a local committee for aid in interesting the school children in buying these stamps. They had not taken hold well in the schools of my city. Patriotism and thrift were the only appeals. Thrift is a dry subject at best even to the adult mind. I wrote a series of stories of Happy Jack Squirrel, the thriftiest of animals, and how he formed a Thrift Club in the Green Forest to which only such of his neighbors as laid up food for future use and thus were thrifty could belong. Peter Rabbit, happy-go-lucky and thriftless, wanted to become a member, and in his misdirected endeavors to be thrifty made plain even to the smallest child the difference

between thrift and thriftlessness. Happy Jack Thrift Clubs immediately sprang up in every school. There were Happy Jack parades, plays, and other activities. The relation of thrift to patriotism was so obvious that no child could miss it. The success of the plan was immediate. The idea was taken up by the state committee and later spread to other states.

Thrift in itself was dry and uninteresting. Happy Jack Squirrel and Peter Rabbit were living characters and therefore of interest to the children. The stories woven around them appealed to the imagination. Subconsciously the children refused to admit to themselves that the little living characters of these stories were wiser than they.

Right there lies the psychology of the animal or nature story as an educational medium. Intuitively the smallest child is conscious that it is superior to any animal. It knows that it is a higher being. No child will admit that any animal knows more than he does, and this is especially true in regard to the smaller animals. Much as the adult looks down to the level of the child, the child in turn looks down on the level of the squirrel and the rabbit.

This attitude has been singularly illustrated in the matter of moral lessons. The old-time story with an obvious moral aimed at the reader will not be read by the average child of today. The child has no greater liking for a preachment than the average adult. A story containing an obvious moral and centering around human characters immediately becomes personal. There is instant recognition that that moral is intended for the reader. It is resented.

On the other hand an animal story may have a moral introduced in the very beginning without giving the slightest offense. I have written hundreds of animal stories, each with a conspicuous moral, without bringing a single protest from my readers. Yet should I write one of these stories with no change whatever save of substituting human characters for the animal characters, the story would not be read. The psychology of it is that those morals are pointed at the animal characters and not at the children. The latter not only do not resent those morals but heartily approve of them. If Peter Rabbit has done that which is wrong or foolish, they desire that he should be taught his lesson. Unconsciously they absorb these morals themselves as I have abundant proof in very many letters from teachers and parents.

I had at one time written a series of stories concerning Jerry Muskrat and the building of his house. I was at some pains to explain that provision is made in the roof of the house for the foul air to escape from the interior and fresh air to enter. At the time of writing I had no thought save that of explaining how Jerry builds his house. Immediately after publication I received a letter from a mother who stated that she had a small boy with whom she had had no end of difficulty because he objected to leaving his window open at night in cold weather. He had whined and cried and complained of being cold despite plenty of bed clothes. "It is one thing," she wrote, "for me to tell him that fresh air is necessary and that he *must* keep his window open. It is entirely another thing for me to read him the stories of Jerry Muskrat and how he provides for fresh air in his bedroom. Now my small boy refuses to go to bed unless he has the window open because if fresh air is good for Jerry Muskrat, it is good for him."

That boy would not admit that a muskrat knew more than he did.

A similar incident concerned a child who had a great fear of the dark. No amount of argument on the part of the parent succeeded in effecting a cure. It was accomplished, however, through a series of stories of timid little animals who find the dark friendly. All fear vanished.

Country boys have written me that

they have given up trapping. To these boys trapping meant not only a genuine source of pleasure but a source of needed income. No one asked them to give up trapping. In none of my work had I ever asked boys to give up trapping. But I had used a series of stories in which were told the experiences of Jerry Muskrat and Billy Mink with traps.

By the simple expedient of giving these animals names they became personalities. From their own knowledge of the habits of these animals the boys recognized that the stories were true. They were not the experiences of any one particular muskrat or mink, but of all muskrats and minks. The moment these animals were given personality they became a part of the world of these boys and infinitely more interesting alive than dead. Furthermore, the sense of justice which is inherent in every boy was aroused, and that instant the desire to add to the sufferings and difficulties of the animals ceased.

It is as natural for the average boy to throw a stone at a bird or to chase a rabbit or squirrel as it is for him to draw his breath. He still is a little savage. To tell him that it is wrong and cruel is a waste of breath. Kindness and mercy cannot be implanted from without. They must spring from within. But in that same average boy is inherent a peculiarly strong sense of justice. Arouse his interest in the daily lives of the lesser creatures and that sense of justice is at once aroused. He at once becomes their friend and champion.

The lives of our four-footed and feathered neighbors run parallel to our own. What we experience they experience, only in lesser degree. Keeping this in mind together with the fact that the child intuitively understands and recognizes his superiority, it becomes a simple matter to convey to the child any desired lesson through the medium of a story concerning a member of the lesser orders. But always there must be rigid adherence to truth and fact in regard to these characters. It is because the child recognizes that the stories are true in all essentials that the lesson is at once taken home. Thus the story that humanizes the animal to the point of the impossible is bound to fail in its purpose from an educational standpoint. It is permissible for Peter Rabbit to talk because the child understands that in all probability there is some form of communication between animals. But it is not permissible for Peter Rabbit to climb a tree or to ride a bicycle. The child instantly senses the lack of truth and this of necessity weakens any lesson which the story may seek to convey.

I have at various times on request written stories to emphasize the need of personal hygiene, the obligations of neighborliness, the necessity of fire prevention, the importance of safety first, the rules of health, the necessity of honesty, and many other subjects which at first thought seem far removed from nature stories. But they are not. There is little affecting human life which has not an analogy in the lives of the lower orders. It is because of this and my conviction of the universal interest in animals plus the universal attitude of the child mind in regard to its superiority that I am convinced of the truth of the premise of my earlier statement that nature study should be the foundation of all education.

The child mind is colorful. Dry facts make no impression. The young mind cannot retain that in which it has no interest. Present those facts in such a way that the imagination may seize upon them and they will be impressed upon the memory forever. Nature presents an interest which is inherent. It remains but to capitalize this by presenting that which it is desired to impart in such form that the imagination becomes but a setting for the truth.

Nature study should begin in the kindergarten and progress step by step through all the grades. Instead of the secondary subject which it now is, it

should be a primary subject. It will, above all subjects, create the love of truth and beauty without which the life of the individual is starved no matter to what heights of learning he may attain.

BIRDS OF THE WORLD*

AT THE beginning of the year 1914 there were in course of publication abroad two systematic works on the birds of the world—the *Tierreich* and the *Genera Avium*. The publication of these works was interrupted by the World War and in the past seven years no further parts have appeared.

The *Tierreich*, written in German, furnishes detailed descriptions of every species, and is illustrated with a scattering of small text figures of structural features. The *Genera Avium*, on the other hand, is in English and differs materially in method of treatment. The species are not described in detail but may be identified by means of keys, generic and specific. Each family is introduced with descriptive matter and all genera are diagnosed.

Twenty-six parts of quarto size have been issued, each devoted to a single and for the most part small family, the largest being that of the Paridæ (titmice), which occupies eighty-four pages. Eight passerine families, six picarian, five of parrots, and six of the lower groups have been completed.

Each part is illustrated with from one to six colored plates. One or more typical forms of each family is figured, with heads of representative genera or species and frequently also the feet, wings, and tail. These plates are useful aids in identification, notably in the genus *Casuarius*, of which the heads of thirteen of the principal forms are figured.

Ten authors, including most of the more prominent European ornithologists, several now deceased, have contributed to this work. As is usually the case with works of divided authorship, the treatment is somewhat uneven. This is evident in the description of family characters, which in some cases are much more extended than in others. This, however, is a minor defect and does not impair the great practical usefulness of the *Genera Avium* as a work of reference for the general student as well as for the professional ornithologist. It is to be hoped that the publication of the *Genera Avium*, as well as that of the *Tierreich*, may soon be resumed.

WALDRON DEWITT MILLER.

*A Review of *Genera Avium*, edited by P. Wytsman, Brussels. Parts 1–26, (1905–1914).

The land on one side of the children's garden house is devoted to ornamental planting. Various kinds of shrubs, easy to raise in the back yards of Brooklyn, are found here. These shrubs, as indicated by the wooden markers, are the gifts of mothers' clubs and of individuals. Many a person comes here to jot down notes on the growth, habit, and appearance of the shrub he has decided to plant on his own home grounds

GARDENING AND THE CITY CHILD

HOW YOUNG LIVES ARE ENRICHED THROUGH THE CARE AND STUDY OF PLANTS AT THE BROOKLYN BOTANIC GARDEN

BY

ELLEN EDDY SHAW*

"The one or two who hold earth's coin of less account than fairy gold,
Their treasure not the spoil of crowns and kings,
But the dim beauty of the heart of things."

TO UNCOVER this treasure of the heart of nature and to unfold before the eyes those things in our everyday life which are indeed beautiful but which are often passed by unseen,—these are the keynotes of the work done for children at the Brooklyn Botanic Garden. This Garden was started about ten years ago, when approximately fifty acres of land were set apart for the purpose by Greater New York.

At the very outset it was decided that a department of public instruction should be established on the same basis as the departments of scientific research. This would not seem quite so radical a thing today as it did ten years ago. The popular education which the botanic gardens of the world have given heretofore, has, for the most part, been a side issue. To those in charge of this new garden it seemed as important to train children of the city in the appreciation of what plant life adds to daily life, both æsthetically and economically, as it did to establish research departments for the benefit of the scientific and agricultural world. The stated aim of the Brooklyn Botanic Garden is, "For the advancement and diffusion of a knowledge and love of plants." In harmony with this aim, it appeared to the director, Dr. C.

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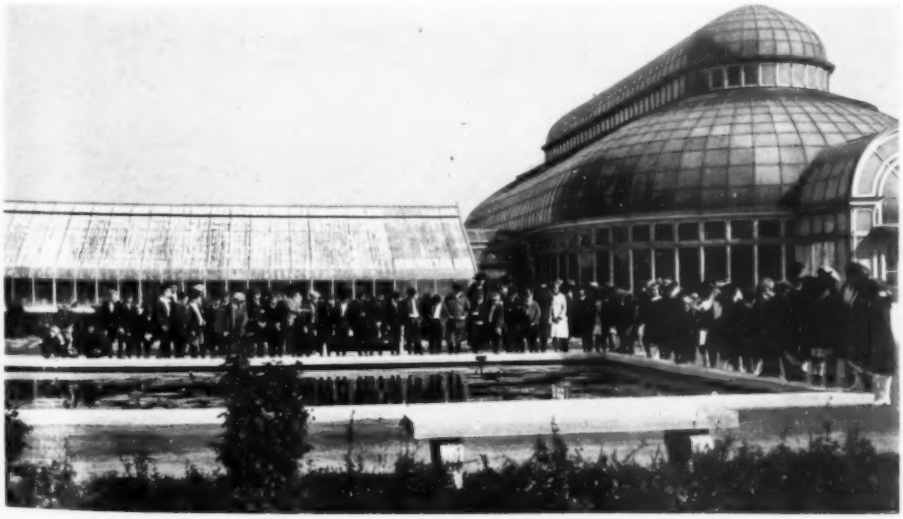
Stuart Gager, that the opening up of the mind of the child to a vision of the great plant world, the marvelous revelations of nature, our everyday dependence on plants and plant products, the industrial importance of plants, the necessity for raising plants and increasing their number in our city and our world was not only a real contribution to education but would also lay substantial foundations for botanical science. To this end and in order to make the work of real helpfulness to the schools of the borough, it seemed the part of wisdom to plan the activities along such lines as might supplement and enrich the work of the schools in nature study, geography, and high school botany.

For the conduct of our work we have two classrooms equipped for lantern projection and provided with a demonstration table; three children's greenhouses; a house containing useful plants from the tropics and subtropics; the general conservatories; the general plantations, including a native wild-flower garden, rock garden, economic garden, Japanese garden, ecological garden, and other sections; a children's garden and children's building; a room for the Boys' and Girls' Club; and an auditorium seating about 570 persons and equipped with a stereopticon and motion picture machine.

During the spring and fall of each year, even from the very inception of the undertaking, boys and girls of the borough have been coming to the Garden in school hours with their teachers. It may be that they wish to study some common trees. If so, you will see them go not only to the auditorium to look at illustrations of such trees, but also out to the grounds in small groups to examine the trees themselves. Or they may have come to get acquainted with the wild flowers, finding the opportunity of doing so in our wild-flower garden, where are grown species found within one hundred miles of Brooklyn. A little incident suggests itself in this connection. A number of pupils from Public School 66 were visiting the Garden. This school, located in a congested section of the city, is made up of children whose opportunities to get out and see real wild flowers are so limited that a wild flower to most of them means a rose or a lily, but rarely to any one of them a real wild flower like those that the country boys and girls gather in the fields and along the brookside every year from early childhood. These school children, one hundred or more in number, came across the city to learn something about the spring wild flowers. They entered the auditorium, one group lagging very much behind the others. Upon inquiry, I found that this group consisted of underfed and undernourished children, who were not to be hurried at all during their walk around the grounds. In the auditorium we showed them slides of perhaps twenty wild flowers, just everyday wild flowers such as most of us think every one ought to know. We had the specimens on tables for them to see as they marched slowly around. The specimens were then packed up in boxes ready to go back to the school, and the little group wound its slow way about the grounds to see as many of the flowers as possible which were blooming in the wild-flower garden.

The same group came back to us a week later to learn how nature disperses her seed, and when I said to a teacher, "It seems to me that such a trip as this can mean very little to these children," she replied, "You might think that, but it is not so. You should have heard these children talking in the basement during play period about the different flowers they had seen, and you would be surprised to know how clear an image remained in their minds." It was a member of that same little group of under-nourished children who came back to me as her schoolmates were leaving the building. Looking out over the grounds she said, "May I bring my father here?" "Yes." "May I bring my mother here?" "Yes." "May

The educational "movies" shown at the Botanic Garden are well attended by children. Thirteen classes, representing as many schools, are here seen wending their way from the building at the conclusion of an entertainment. Three classes just filled the auditorium. "Movie days" are great days. The children come by invitation and wear their best clothes. They bring their class banners. The different elementary schools supply the music. Sometimes this music is rendered by a talented young violinist; sometimes a whole orchestra participates. A delegate from each school tells all the other children in the auditorium the name of the school that he and his classmates represent and some little point of interest about the school



Visiting classes studying lilies in the new pools. Without the necessity of traveling to the country, these children find at the Botanic Garden water plants that are growing under natural and normal conditions

mother bring the baby?" "Yes." She drew a long breath and sighed, "It's just like heaven."

It is not from the poor sections alone that we draw our visiting classes; they come from all sections of the city, from all the schools, the private as well as the public ones. We have tried from the very beginning to establish in the minds of the public this fact: that our educational work is not for the poor alone, nor for the rich alone, nor for the middle class, but for all classes and conditions of children.

Many classes from the upper grades of the elementary schools come for subjects which bear directly on their work in geography, such as coffee culture in South America, forestry, or what plants mean to the world's commerce. The lectures on plants used in industry are readily elucidated by the specimens we have always on hand growing in our economic greenhouse; entering this greenhouse the children are transported from Brooklyn into the tropical and semi-tropical regions where the banana plants grow and bear fruit, and where coffee trees and tea plants may be seen. The rope-making plants (sisal and Manila hemp), the citrus fruits, the fig, the bamboo, sugar cane, rubber plants, vanilla, and plants of the desert—all these are growing here for us to look at.

On Saturday mornings and after school from October 1 until the middle of April classes of boys, and of girls, too, are at work in the children's greenhouses, learning how to plant bulbs, make cuttings, repot plants, and start seedlings for their outdoor gardens

No class ever comes for our lectures on plants and other nature topics without taking away from the Garden some potted plant, which is presented either for classroom decoration or for experimentation. These gift plants measure the zeal of our older boys and girls, for the most part high-school students, who come back to the Garden in small groups once every week throughout the spring and fall to care for, plant, repot, and keep in condition this gift material. We gave away in this manner, during the past year, more than 1500 plants.

We have regular classes on Saturdays and after school. These classes are held in two series, one in the spring and one in the fall. The fall work covers such subjects as the planting of bulbs, the making of cuttings, the repotting of house plants, and the making of wicker containers for plants. The spring work consists largely of starting seedling plants for the vegetable garden, the flower garden, and the window garden. In this course of instruction, which includes from five to eight lessons, each child pays the small fee of fifteen cents to cover the cost of the materials that he carries away with him. Often the question is raised whether some children do not find it impossible to pay this fee. The reply is in question form: how many children have you seen in the city who could not go to the movies or buy gum and candy? In connection with the charges, ranging from twenty-five to fifty cents, made for the rental of plots in our outdoor garden, we have known of only two instances of inability to pay. In such cases we arrange to have the children earn the sum by assisting in our work. Usually the number of pupils in an indoor after-school class is limited to twenty, but occasionally we have had from twenty-four to thirty children. More cannot be admitted because of the limitations of space in the greenhouse visited.

It is interesting to go into the children's greenhouses on a Saturday morning and see each house filled with youngsters working away at the benches. Perhaps in one house a teacher is demonstrating how to make cuttings, and the boys and girls are earnestly working with old stock plants of geranium, dusty miller, coleus, ivy, and mesembryanthemum, making cuttings which will be just right in length, in the method of cutting, and in the amount of leaf surface for evaporation. Do we teach them scientific names of plants? Sometimes, not always. Many of the plants have no common names, and a word like mesembryanthemum or chrysanthemum is probably no harder to hold in mind than are the words Mediterranean or Cinderella. The children that attend these Saturday morning and after-school classes come of their own volition, introduced by a friend, a teacher, or a parent. These classes are not made up solely of children of the neighborhood. The Saturday classes, for instance, include children from the entire borough, and we have even had children from Queens, Manhattan, and Richmond. In school time, too, work of this nature is given. Children come with their teachers from elementary schools for four or five successive weeks to take courses in plant propagation.

Our outdoor garden covers about three-quarters of an acre and last year a crop worth more than $3,220 was taken out of it. Children pay twenty-five cents for an 8 x 10 ft. plot during the six months' period of instruction. This is the area allotted to beginners and sometimes to second or third year pupils who need to go over the lessons which come in the first year's work. Thirty-five cents is paid for an 8 x 12 ft. plot, and fifty cents for a 12 x 18 ft. plot. The boys and girls having these larger plots make their own plans, determine the proper crops for succession and recropping, and make a more advanced study of gardening. The fee covers the cost of the seed which the children use; the crop belongs to the child. A crop record is kept, and a good gardener, on an 8 x 10 ft. plot,

At the beginning of the outdoor season, the children all march down into the garden for their first day of planting. Old Glory is carried ahead. In the garden the markers, garden lines, and stakes are placed ready. This saves time. Note the big boys stationed here and there. They are called garden assistants and do a great deal of work with the younger children

raises in one season a crop worth from $7 to $10. The crop produced by some of the younger children working a similar area sometimes does not exceed $5. The ages of the children vary from eight to eighteen years. Some of the older boys and girls of high school age are called garden assistants and give a great deal of help to the younger children. In fact, we have found that these boys and girls are doing much in their own communities to further interest in outdoor gardens.

We try to make the garden educationally worth while. The fact that we had an astounding crop this past season does not mean that we strove for such an abundance; our aim was to have good work based on sound principles. There are other lessons in our garden besides the raising of vegetables. In the summer, you must arrive at eight o'clock in the morning, or a little before, if you expect to be ahead of the boys and girls. You enter the garden through twin white gates under a rose-arch. You then stroll up the red brick walk until you come to a little white house with green blinds. In front of the door is a brick platform and over the door is the following couplet:

> He is happiest who hath power
> To gather wisdom from a flower.

Through the opened door you step into the room where we gather and talk over our problems of the garden and of life. Connected with this room on the left is a girls' cloak room and on the right are similar accommodations for the boys. Upon entering the house the children go directly to an oak table, look over some sheets, and make a check mark against the number of their garden therein recorded, thus indicating that they have attended that day. They then go out through a central door to our tool room —the house is really a glorified tool house —which is always in apple-pie order unless it is a muddy or wet day, and then the house committee is constantly cleaning up so that it may be in good shape. Our tools are arranged about the wall; in little cubby-holes you will see the

trowels, the measuring lines, and the pointed sticks which the children use to make the drills when planting seed. There are also bottles of seed from which the teachers give out the necessary amount for the day. The boys and girls do not linger here, but go straight out the back door to the bulletin board, where they read what tools they will need for the day's work. It may be a day when we are cultivating our gardens, and hoes or hoe-rakes are required; or it may be that worms are appearing on the carrots and that the bulletin board has something to say about that. After selecting the tools needed, the children go into the garden and report to the teacher assigned to the special section. This teacher then looks over the individual plots and explains the work for that day.

In no two cases after the first planting do the plots look alike. One of the things which will come out of a piece of garden work is this: that your sins will surely find you out. If a person plans carelessly, his crop comes up in just such a way; if he fails to thin as he has been taught to do, his crop is bound to be inferior to that of the student who has thinned properly. The mistakes of the individual appear right on the face of the garden, and it is by recognizing these mistakes and resolving to avoid them in the future that we gain in power to do our work well. Beginners in our outdoor garden have a planting plan which has been given them during their indoor work. No boy or girl may have a plot who has not attended our spring garden courses, because in these courses we take up the principles of our outdoor garden work, make our plans, and learn to know our seeds.

Just as soon as the first crop comes out of the garden, and that first crop will of

A group of older girls gathering in a harvest of vegetables. These girls come to the Garden from the Brooklyn Training School for Girls. They have a community plot and raise vegetables enough to be of real help in supplying the table at home

course be radish, the child has a choice of certain seed he may put in the earth for a second crop. He chooses according to what mother and father like. We try to link the home life as closely as possible with our work. After a child has been two seasons in the outdoor garden, and sometimes after one season, he is ready to plan his own garden under direction. Matters are discussed, plant families are considered, the type of vegetable—whether it is a leaf, root, or stem crop—is determined upon, and then the plans are drawn up at home and brought to us for inspection. Sometimes a plan will appear on an old paper bag because no better material is available at home. One boy, apparently not knowing how to draw to scale, brought a plan on a piece of paper the length and size of his plot! It was highly amusing but rather awkward, since the boys and girls carry these plans right into the garden with them and do their planting from them. The older boys and girls make much more pretentious plans than the younger and are very keen in using to best advantage the space allotted to them. Many questions arise in regard to insect pests, common weeds, soil experiments. Around the little garden house a variety of shrubs have been planted: shrubs that are easily raised, that blossom early and late; that have bright berries which will last all through the winter. You might happen to visit us on a day when you would see boys and girls in and out among the shrubbery with notebooks and pencils, making drawings of types of leaves, studying the blossoms, learning all they can about the shrubs. These shrubs are for the most part gifts of the kindergarten mothers' clubs of various city schools.

The formal flower garden with its sundial, the present of one of the teachers' training classes of the Botanic Garden, is another spot of interest to the children as well as to visitors. More and more we are putting perennials into this garden and keeping our annuals for our picking garden. The perennials have been raised from seedlings by the children in the greenhouses. In fact, this garden represents the boys and girls. The little rose garden is to be a memorial garden to those boys and girls who have been with us awhile and all too soon have left us.

Once when speaking in one of the largest schools on the lower East Side of Manhattan I told the children of the little white house, the rose-arch, the brick walk, the flowers, the little vegetable plots, the motto over the house door, and then asked them of what it made them think. Two thousand boys and girls spoke as one, saying the single word, "Home." Yet those children lived under the poorest of conditions; their dingy tenements were devoid of lovely rose-arches and blossoming flowers: notwithstanding, such a picture seemed to them typical of home. So a part of real educational work is to implant in the minds of children the desire for things that are attainable, and to stir up that which pushes all of us on, a vivid imagination.

One year we had in our garden a most interesting little group of boys who had to walk several miles across the borough to come to their work. One boy was appointed captain and he told me that he started on his rounds at five o'clock in the morning waking his friends, making them have their breakfasts, and then marshalling his little troop across the city.

The boys and girls of our summer garden work not for the garden alone but in different forms, and in various ways plan something in the interest of the community. Some years the children have contributed vegetables once a week, to be carried in baskets to homes, orphanages, or hospitals. One season, during the war, we sent flowers every week to a hospital where tubercular sailors were being cared for. We felt that it was our duty and pleasure on that particular day to make sure that, regardless of weather, flowers went to the hospital. I can remember rainy days when the boys would

go out in two's, one holding an umbrella while another picked the flowers. Gay little messages went back and forth between the sailors and our boys and girls. At the beginning of the season we were sending flowers to thirty sailors in that hospital; at the end there were only two left whom we could cheer in this way. The others had gone "westward."

The boys and girls who come to our garden and to our indoor classes form what is called the Brooklyn Botanic Garden Boys' and Girls' Club. The members usually meet four times a year in the auditorium of the Botanic Garden building. The most interesting part of the programme consists of the speeches, for sooner or later all these young people must address the club on some subject of garden and plant interest. They have special topics in which they prepare themselves over a period of six months or a year. Such subjects as the following are representative: common trees in Prospect Park; good flowers to have in a garden; different methods of testing seeds; bagworms and the destructive work they are doing on the trees of our city. We call this research work, a great and dignified name which makes all the participants feel the importance of really doing their best. They value the opportunity to stand on their feet and discuss what they have learned.

The last of September boys and girls come from all over the city bringing to our annual children's garden exhibit those plants which they have raised either in school or home gardens. Some schools send big automobile trucks containing their exhibits. Others charter a local team, or even ask a good-natured baker, expressman, or anyone interested in their work for the use of his conveyance. Some of the exhibits are pathetic. Some of them are remarkable. No exhibits may be entered from our own garden.

The children's garden exhibit has been held every year since our children's work started nearly nine years ago. The first year a most amazing number of old tin cans filled with the strangest-looking plants arrived for display. The plants came in all conditions of decrepitude. Most of them were brought in pushcarts or in the arms of children across the city. One small child carried a pot in which was a common ragweed, evidently tenderly cared for and proudly placed on

All summer long the children pick flowers in the formal flower garden and every week each child has a bouquet to carry home to mother. The poplars in the background act not only as a windbreak, but as a screen, shutting out unpleasant sights and enclosing the children in what they regard as their own little home grounds

exhibit as if its owner felt that she had reared the most remarkable plant in the United States. One little boy had a lovely lily in bloom, but when he was taking it from his home to school another boy, who was a subject for constant discipline, came up to him and broke off the flower. The little lad, with lily in hand, went to his principal, crying because the beautiful plant upon which he had centered so much thought and attention was ruined for the exhibit. The principal looked it over, helped him tie the flower on the stem and sent two guards with him to protect him on his way to the exhibit. These seem just little things, but are really big things in the development of character and appreciation. We have raised the standard for entrance to our garden exhibits each year, and the boys and girls know that to qualify they must plan accurately and tend carefully.

One season a very lovely potted nasturtium plant in full bloom took first prize. The aunt of the owner told me the story connected with it, for there is usually a story that goes with each individual exhibit. The lad had cared for his plant all through the hot season at his summer home in New Jersey. When the family were about to return to the city in the fall, the boy told his mother he intended to bring back his plant with him, but she, because of having so much to attend to, said they simply could not attempt it. On the way to the station the boy intimated he had forgotten something and went back. When he rejoined his family, he was carrying his beloved plant. Of course, then his mother did not have the heart to refuse his wish. So it was entered in the exhibit and received first prize. His aunt said that the recognition thus accorded was the first big thing that had ever come to that boy. He had seemed to his parents a rather mediocre scholar, had been outstripped by his brother in all school and home activities; yet all of a sudden he had accomplished a piece of work which in its class was preëminent. Little things and little inspirations point the way to bigger things in the lives of children and lead to real achievements in the larger tasks of the future. We are often asked if we give these courses to help train farmers. Our reply is always the same: we give them to help train men and women.

Our educational work is not confined to children. Courses are offered for teachers, some of which count toward advancement in the city public school system and for college credits. These courses are given after school and, with the exception of a few short courses, cover a period of thirty weeks. In certain years the Botanic Garden has conducted a short summer session for teachers so that in a very limited time some experience may be acquired by a teacher in work with children in the outdoor garden. The practical work done in the field is almost entirely along the lines of plant identification, tree study, and to some extent, control of injurious insects.

Extension courses are given for teachers of children's gardening and nature study. These courses are so arranged that they emphasize not only the theory of each subject but also its actual practice in classroom, greenhouse, garden, or field. At the same time the work is correlated to meet the needs of each grade of the elementary school.

Since figures often are enlightening and convincing, this statistical report may be in order. During 1921 the attendance was as follows:

In regular garden classes	24,008
In visiting classes	24,811
At lectures (children and teachers)	14,985
At talks given in schools and clubs	15,581
Total attendance	79,385

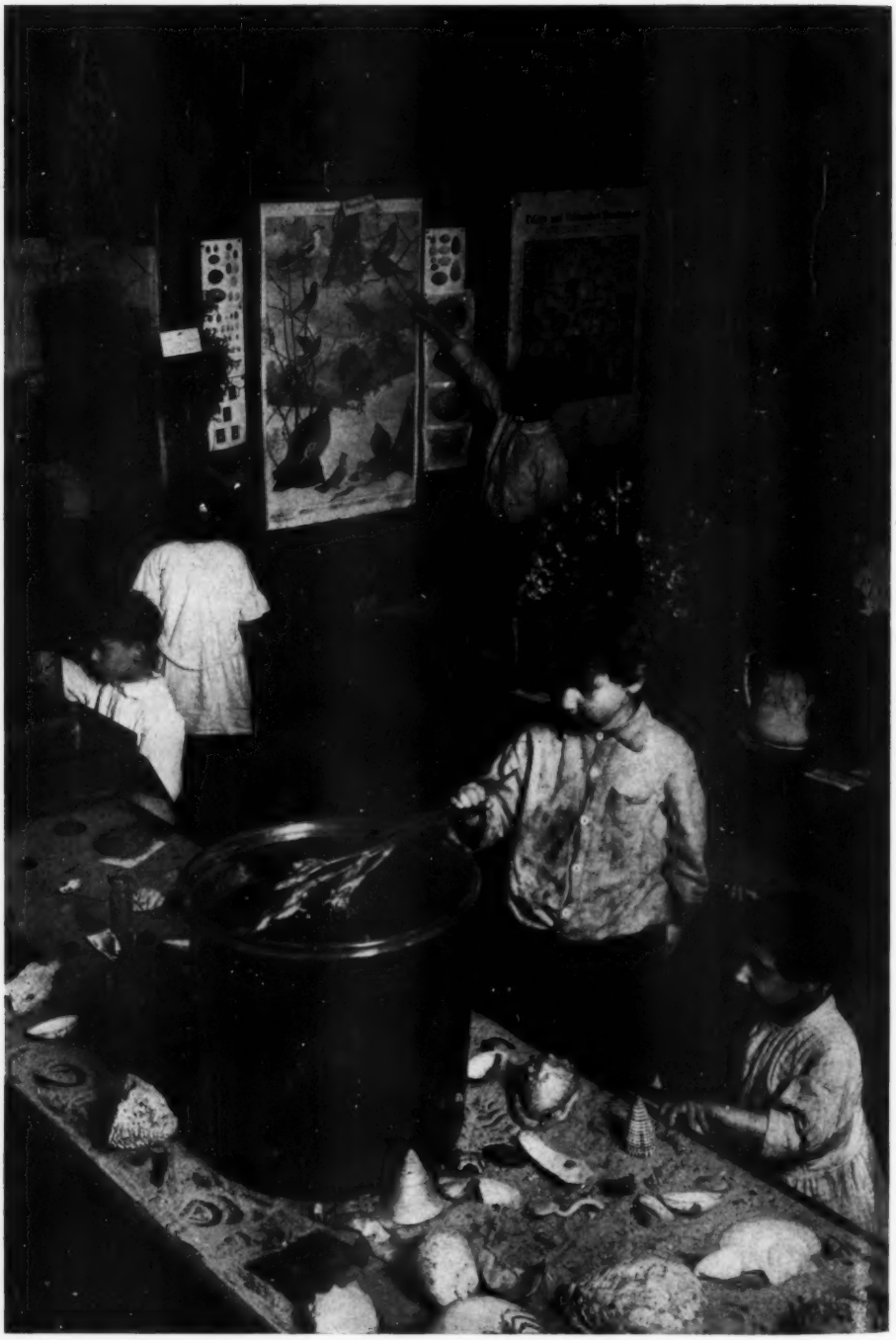
Among the elementary schools of Brooklyn 86 per cent have used the Garden; this figure does not include the private schools. All of the high schools have availed themselves of it.

Perhaps the best summing up of the reasons why boys and girls come here

was given by a small boy in our outdoor garden, who, when asked why he came to the Botanic Garden, straightened himself up, thought a moment, and then replied: "I am here for three reasons: first, for elementary instruction; second, because I like it; and third, because I get a crop."

Since more than one half of the children of the United States live in the cities and not in the country, more and more it behooves all educational institutions to do their very best to give children something of that background which you and I had when we were children growing up in the country or in communities that did not resemble the congested cities of today. What in later life can equal the experiences enjoyed in the great out-of-doors in early youth? What substitute is there for that first thrill of early spring when the red maple blooms in the swamp, or the pussy willow shows its soft and fuzzy little catkins? What can compensate us if we are deprived of that stroll along the brook, of the opportunity to paddle in the water and to pick wild flowers? Nothing. Our natural history museums, our botanic gardens, and our other public and private institutions, not to mention individuals, must give as a part of their contribution to the background of this generation, all that it is possible to offer in the way of natural surroundings to the children of the cities, so that these children may catch a little of the vision that is gained from nature herself, and catching it, may never lose it.

The little rose-arch through which the children enter the garden



A BIT OF THE SEASIDE TRANSPORTED TO THE SLUMS

The children who visit the nature room in Norfolk Street love their "beach" and examine with interest the shells of varied shape that bring to them a suggestion of the teeming life of the ocean-washed coast

MAKING NATURALISTS IN NORFOLK STREET

BY

MRS. JOHN I. NORTHROP*

NORFOLK Street is in the heart of the congested East Side and anyone who has been there will know that naturalists are the last thing it suggests. Nevertheless there are boys and girls in Norfolk Street who can recognize the common birds and insects, flowers and trees, shells and minerals, and can tell you something about them in spite of the fact that a year ago many of them had never been away from city streets in their lives and scarcely knew such things existed. The miracle has been wrought by the nature room, which was established by the School Nature League in Public School No. 62, 25 Norfolk Street, as related in a former article in this magazine.[1]

Originally a dark, dingy schoolroom on the ground floor, it has been so transfigured with cedar and oak branches, club mosses, bittersweet, smilax, and other woodland treasures that the face of every new visitor invariably lights up with pleased surprise as he crosses the threshold. What wonder that the little dwellers in these squalid streets find it a land of enchantment! "A veritable little garden of Eden," one visitor called it. One of the boys referred to it as "the grandest room I ever saw. Why! the decorations such as fish, trees, nests, birds, shells, and vegetation would bewilder anyone." Another wrote, "The wonderful flowers, beautiful minerals and birds, colored shells, and many other things of nature make me happy when I come to the nature room—I feel just as happy as in a big park."

Naturally the live animals arouse the greatest interest—the aquarium with its fish, newts, tadpoles, and snails; the terrarium with its frogs, toads, Florida lizards, and the always fascinating snake, which the children beg to be allowed to hold in their hands. A box tortoise is a never ending source of surprise, and a pair of guinea pigs always have an admiring audience. Just at present a baby alligator is the star attraction. Of the other exhibits, it is difficult to say which the children like best, the beach with its shells, coral, and starfish; the trays of cool, green moss with growing ferns, partridge berry, and wintergreen; the miniature garden with its cedar-crowned hillock, rocky ledges, pools, and bridges; the tiny desert with its sand and cacti; the birds and their nests; or the plants and flowers. The mineral corner with its mica, lava, fossils, and other attractions is always surrounded by an interested group as are also the mounted animals among the evergreens—porcupine, woodchuck, beaver, and squirrels—and the insect corner with its moths, butterflies, and other six-legged crawlers and fliers. Every exhibit is fully and plainly labelled. Our visitors also take much interest in the Audubon bird charts and in Murrill's mushroom chart. One small girl of six could name every bird on one of the charts, the kingbird being her favorite.

This nature room is filled with interested and happy children most of the time. It is a neighborhood nature room, being visited during school hours by classes with their teachers from ten different schools. There is a certain period allotted to each school, and classes usually make half-hour visits. Some of the teachers tell us their children talk of their prospective visits long in advance and of what they have seen for weeks afterward. I might say incidentally that although the room is visited by from eight hundred to a thousand children every week, and they are allowed to

[1] NATURAL HISTORY, May-June, 1920, pp. 265-276.

*President of the School Nature League of New York City.

FLOWERS DELIGHT THE CHILDREN OF THE LOWER EAST SIDE

In the narrow, brick-walled city streets that bound the lives of these children, there is nothing to remind them of the bright, green world without, but in the nature room they find the fresh growths and soft bloom of the country

touch and handle many of the specimens, very rarely is anything lost or broken.

The most interesting times in the nature room are on Tuesday and Thursday afternoons between three and half-past four, when it is thrown open to any child who wants to come in and when older visitors wishing to familiarize themselves with the work of the League are also made welcome. Such free access has been the custom for two years, yet the attendance shows no sign of falling off, averaging about seventy, all that the room can comfortably hold. The children crowd in as soon as the door is open and are loath to leave when closing time comes. They are of all ages, from toddlers of three and four to those of high-school age, but the great majority of our constant visitors are between eight and twelve or thirteen. They find here an open door into a land of enchantment where everything has a story as wonderful as any fairy tale. We show them the marvelous domicile of the trapdoor spider, the little grub in the heart of the gall, the wonder of the branch packed away in the little brown bud, the sleeping pupa in the cocoon, the fossil in the rock. No wonder they say that "everything in the room is like magic."

The nature room of the League is a live, connecting link with the wide world of out-of-doors, the idea being that through this medium the child may at least glimpse the wondrous panorama of the changing year. Therefore, many of our specimens are changed with the seasons: evergreens and cones in winter, budding twigs, sprouting seeds, frog spawn in spring; wild and garden flowers as early and as late as we can get them; fruits, seeds, and vegetables in the fall. Our specimens are not always local. Sometimes kind friends send us treasures from far away. We have had tropical plants, fruits, corals, and shells from Florida, desert plants from Texas and Colorado, cotton and peanuts from South Carolina, and a large and varied exhibit from California. We also post and give out nature poems by Wordsworth, Emerson, Lowell, van Dyke, and others when they are most appropriate.

Many of the children who came each day the room was open were soon quite certain they knew everything in it. They were enthusiastic over our suggestion of testing their knowledge; accordingly, at stated intervals, those who wish are given the opportunity of showing what they know. The labels are removed and the candidates, who must be ten years of age, are taken about the room and requested to point out and name at least three of each of the following: birds, bird nests, insects, branches or leaves, flowers or fruits, shells, and minerals. There is also a written test in which the children must name correctly at least ten out of fifteen miscellaneous specimens chosen from those that have been on exhibition in the room for some time. The children who pass both tests are entitled to wear the button of the League and to be known as junior members, a title of which they are immensely proud. Up to date there are forty-four such members, twenty-nine boys and fifteen girls, and more are preparing for the tests. Two ten-year-old boys who had never been out of the city passed perfect tests after having been to the nature room only six times. This is surely eloquent testimony to the value of visual instruction and also to the eagerness of these children to learn. We have tried to give our junior members further opportunities of seeing and learning. The first twelve were taken to the International Flower Show and we were surprised to see how many flowers among all that bewildering mass of bloom they recognized as having been "in our nature room." Finding that six out of eighteen had never been out of city streets in their whole lives, we arranged an all-day trip to the "real country"; at Woodlands they had their first blissful experience of picking flowers for themselves. We were amazed to see how many trees and flowers they could identify, not only in the field, but from

The mineral collection in the nature room has proved very instructive

the cars. "Pine," "iris" "snowball," "lilac," "white birch," they called out as they passed. They recognized birds they had seen only as stuffed specimens or on a chart, and they knew mica, schist, trap rock, and granite from the small bits in their mineral corner.

During the summer many of the junior members were able to spend at least a week in the country, but nine who were not so fortunate and had never been to the real country were invited, in late October, for a Friday to Monday visit at my farm in the Berkshires. What never-to-be-forgotten experiences they had! One of the boys wrote, "I cannot express how wonderful the surroundings were and how much it led me to think I was in a real fairyland. So I thought while staying there." If any further testimony were needed as to the value of the nature room and what it has put into the lives of these children, the greatest sceptic must have been convinced had

he seen them going through the woods and fields, calling out, with the same alert interest as had the children taken to Woodlands, "white pine," "pitch pine," "white oak," "red oak," "scrub oak," "laurel," "club moss," "New York fern," "marginal shield fern," "reindeer lichen," "quartz," etc., and furthermore able in most cases to give the reasons for their identification, and had he also witnessed their unbounded delight in recognizing old friends of the animal world and their eagerness to make new ones. There was only one time when they looked perfectly blank. I had suggested their going out to the chicken house to get the phœbe's nest there. "Come show us," they said, and I suddenly realized that although they would have recognized the phœbe's nest because we had one in the nature room, a chicken house was entirely outside the ken of a Norfolk Street child and not one of my visitors had the faintest idea what to look for.

In November, the junior members, numbering then only about twenty, were taken to the woods near Ardsley where they collected leaves and fruits and rapturously captured a snake, a frog, and a salamander for "our nature room." We have not only taken the children to the woods but we have introduced them to the museums. A number now have the "museum habit" and they are also acquiring the "notebook habit." A small reference library has been installed in the nature room and instead of telling them the names of new specimens, we often send them to the books to find out for themselves. They think that a fine game.

The boys and girls who passed the first test last spring have been eagerly looking forward to a second. Those passing these much more difficult requirements are to be known as young naturalists and they will really deserve the title. To acquire it they must be able to name six animals and at least six specimens in each of the groups of nature previously referred to as against three required in the test for junior membership. In the written test they must name correctly at least twelve out of fifteen specimens, which are to include three ferns, three mosses or lichens, two fungi. They are to make notes on all the "nature" to be found in Seward Park (around the corner from the nature room) and to select some particular tree, make a drawing of it and note everything regarding it they can see. They are to go to the American Museum of Natural History and make a study of one of the following: the New England spring group in the reptile hall, any four permanent bird residents about New York City and their nests, or the marine life in the Woods Hole or Nahant exhibits. They must be able to tell something about the plants and animals in the group selected and everything they can learn from the exhibit itself as to the lives and habits of the animals shown. They must also help some boy or girl prepare for the first test. This they love to do and every afternoon one may notice newcomers to the room being piloted about by junior members and gravely instructed how to distinguish the different evergreens, how to tell the budding twigs apart, what names to give to the shells on the miniature beach and to other objects. The nature note books of the candidates also count in this second test. These were started at our suggestion when the room closed last summer and have been kept up with the greatest interest ever since. Some members have five or six by this time in which they have mounted leaves and flowers, often with notes telling how they may be recognized, small shells, bits of bark, etc., interspersed with pictures, poems, bedtime stories, and articles by naturalists from various papers.

Up to date nineteen children have passed the oral test and instead of naming only six specimens, they wanted to go on and name everything in the room. So far thirteen have passed the written test, two with perfect papers. The specimens

The spell of Mr. B. T. B. Hyde's personality has thrown a charmed circle about these boys, junior members of the School Nature League, who late in October were invited by Mrs. Northrop to spend a week-end at her farm in the Berkshires

they were asked to name were the fruit of the sensitive fern, Christmas and polypody ferns, haircap and white or cushion moss, reindeer lichen, beefsteak fungus and earthstar, a vireo nest, a mounted meadow lark, a beetle, leafless twigs of black birch and garden cherry, lead ore and lava. How many country children between ten and thirteen would know these things?

It is all a most interesting educational experiment. When one remembers that a year ago or even less, the minds of these children, so far as knowledge of nature was concerned, were a blank, it is remarkable that they have been able to absorb so much through these informal visits to the nature room. Better still, it has put a new and absorbing interest in their lives. It would add very greatly to the value of the experiment to take these children who have done such good work in the nature room all winter and give them the opportunity to go on in a nature camp during the summer. If we could take them in groups of twelve or fifteen for a month's stay and let them spend half their time working in individual garden plots, where they would have the joy of making things grow, and the rest of their time in woods and fields learning from nature herself, it is impossible to set bounds to what this might do for these children, physically, mentally, spiritually. If some fairy godmother or godfather will only materialize to help us with the necessary funds and the right kind of a director be found, the League would be glad to organize and carry on such a camp. There is none that we know of on just these lines.

So far I have spoken only of the work

Other occupations of the nine happy youngsters shown in the picture on the opposing page. Their baskets are full of specimens. Mrs. Northrop has offered her farm as a site for the camp which she hopes can be established for the children of the League

of the League in one nature room, that at our headquarters in Norfolk Street, and mainly in relation to its effect on individual children. I would like to call attention to some broader aspects of our work. One of the objects of the School Nature League is "to work for the establishment of a nature room in every school." Up to date we have been instrumental in starting twenty in various parts of the city. Owing to the lack of space, four of these are very small rooms and six others only "nature corners," yet even under these adverse conditions, the testimony is always the same: they are a source of inspiration and a never-ending delight to the children. What might not a spacious, well equipped, well lighted room (on the roof perhaps) mean to a school?

A real nature room such as I have described makes a strong appeal to the child's curiosity, love of beauty, and to his imagination. Instead of being more

or less passive recipients of a balanced intellectual ration poured into them in the hope that some of it may be assimilated, the children become eager seekers after knowledge about things in which they are intensely interested. As they throng about the tables, they suggest hungry little animals putting out tentacles in every direction, seizing with avidity on the knowledge they want, and finding learning not a task but a joy. If every school could have a nature room, perhaps not the least of its services might be to make a breach in some of the antiquated, formal, dry-as-dust methods that are still too much in evidence in many of our schools.

Another potent argument for a nature room in every school is that in addition to its main purpose of teaching nature, it can be correlated with many other subjects. It is a great help in geography, supplies specimens for drawing and painting, furnishes endless subjects for compositions, and through the child's interest in the nature poems leads to a real appreciation of literature. A nature room is also a special boon to the ungraded and foreign classes. Experience has shown that it quickens the slow mental processes of the subnormal child and that it helps the newcomers to our shores acquire a vocabulary in a minimum of time and with a maximum of pleasure.

But after all, it is not the knowledge that the nature room is putting in children's heads but what it is putting in their hearts and lives that really matters. A visitor who knew children and knew the schools, after spending an hour in our Norfolk Street room with some of our junior members, said when he left, "I firmly believe those children are getting in your nature room the best things they will get out of their whole school life." Our five years' experience, corroborated by the testimony of teachers and parents, has proved to us that through the nature room we develop a side of the child's nature that other subjects do not touch. We also put in his hand a talisman that may prove a source of joy all his days.

On the civic side I believe that a real nature room would do more to encourage conservation and check vandalism than any other agency. The children learn there to love plants and animals, which means that they will not injure the one nor be cruel to the other. This was impressed upon us when we took our junior members for their first day in the country. Without any admonition or instruction from us, not a flower or a leaf was thrown away; everything they picked was cherished and taken home.

Looked at in the broadest aspect, nature rooms in the schools would surely prove an important factor in starting little currents of population from the congested cities back to our abandoned farms. Our junior members are all longing for a country life and hoping to be gardeners and farmers and naturalists, and doubtless some of them will really attain their wish. With the continually increasing influx cityward, is not any means to stem the tide worth trying? As the result of our five years' experiment we firmly believe that a nature room in every city school would fill a vital need and would prove a source of lasting benefit not only to the child, but to the school and to the community.

FEATURES OF THE PROPOSED ROOSEVELT-SEQUOIA NATIONAL PARK

BY

FRANCIS P. FARQUHAR

WHEN the Sequoia National Park was established in 1890 to preserve the giant trees of the Sierra Nevada in California, very little was known of the high mountain region immediately to the eastward. A few mountaineers and explorers had penetrated into the vast cañons of the Kings and Kern rivers and had crossed the principal passes; geologists had hastily inspected the country; and prospectors had tried the rocks for metals and had found them wanting. For the most part the land was given over to sheep-herders to be used and ruined without let or hindrance and without fee or tax.

Then two things happened: the people of the San Joaquin Valley, the great central valley of California, whose lands were watered by the streams from the mountains, discovered that the safety of the natural storage at the sources was being threatened by the sheep; and at about the same time the public became aware that hidden in these mountains was some of the finest scenery in the United States. In an article in the *Century Magazine* for November, 1891, John Muir called attention to this splendid region and spoke of the Kings River Cañon as "A rival of Yosemite." He urged that the park boundaries be extended to embrace it and concluded: "Let our law-givers then make haste before it is too late to set apart this surpassingly glorious region for the recreation and well-being of humanity, and all the world will rise up and call them blessed."

Army officers, sent to guard the new park from depredations, reported both the damage done by the sheep and the impression made by the majestic scenery. It is interesting to turn back thirty years and read what Captain Dorst of the Fourth Cavalry had to say in his report to the Secretary of the Interior for the year 1891:

"There has been some talk of the propriety of further extending the park to the eastward to the main divide of the Sierra Nevada range. . . . . But aside from the objects of interest, the prosperity of the population living in the valley between the Sierra Nevada and Coast Range depends upon the preservation of the timber and brush-wood in the mountains. . . . Sheep destroy much of this brush and herders often set fire to it in the fall to destroy it, as the ground will furnish a good crop of grass next season. . . . Knowing how much the welfare of a large population depends on this matter, I am in sympathy with any plan that will preserve the mountainous country in its natural state."

Captain Dorst's successor, Captain James Parker, was equally impressed and wrote in his report for 1893:

"By taking in a portion of the forest reserve east of the Sequoia and General Grant National Parks there would be included a country devoid of inhabitants or settlements, without roads, but naturally suited for a game reserve. It would include and preserve the sources of the Kern River, a stream which is much depended on for irrigation. It would reclaim from the sheepmen an area now almost impassable to the traveler, to such an extent is every living thing eaten off the face of the earth and trampled under foot by the hundreds of thousands of sheep which every year roam over that territory. . . . This extension of the park would include what is perhaps the finest fishing ground of America, or of the world, the Kern Lakes and the upper waters of the Kern River. It would include some very picturesque country, notably about Mount Whitney."

Ten years saw a change for the better:

Photographed by Francis P. Farquhar

Milestone Mountain on the Great Western Divide toward the southern extremity of the proposed park is a remarkable tower of splintered granite, the remnant of a higher peak of ages past

Photographed by Ansel F. Hall

Sculptured peaks and cañon walls in the headwaters of the Kaweah River

Photographed by Francis P. Farquhar

Alpine lakes, with the deep blue of stained glass windows, mirror on a still day the calm beauty of the mountains. The lake here shown is at an altitude of 10,500 feet

Photographed by Francis P. Farquhar

Mount Brewer seen from a vantage point near Bullfrog Lake

Photographed by Francis P. Farquhar

THE PALISADES

These splendid ramparts form a mountain barrier along the northeast boundary of the park. They are among the highest peaks in the United States. North Palisade, on the left, attains an elevation of 14,254 feet. Another 250 feet added to its height would make it tower above the loftiest peak in the country, Mount Whitney. On the right is Middle Palisade, 14,049 feet in elevation, which because of its greater proximity appears to outrank its neighbor. The view is taken from Mather Pass

Photographed by Ansel F. Hall

IN THE HIGH SIERRAS

On the left is Mount Needham; the dominating peak on the right is Sawtooth. Although less than 14,000 feet in elevation and therefore not sharing the distinction enjoyed by ten other peaks within the proposed Park, these lofty mountains, seen from Black Rock Pass, offer a majestic spectacle. Three terraced lakes are visible in the picture, their basins appearing like stepping stones for the upward climb of some mountain Titan

the sheep menace was removed by regulating the grazing and the wonders of the High Sierra became more widely known; and still the army officers advised the extension of the park boundaries. In 1901 Captain L. C. Andrews of the Fifteenth Cavalry wrote:

"If, on the other hand, it is desired to combine the wonders of nature in this section into a national park to be in the same class with the Yellowstone and Yosemite, this, too, can be done. The canyons and mountains are here as grand, perhaps, as any in the world. Within reasonable distance of the Giant Forest as a central feature, . . . are the Kings River and Kern River canyons, reported to be the deepest in the United States, and Mount Whitney, the highest mountain."

Another decade saw a distinct advance in the knowledge of the country and in the recognition of its value as a national park. Again, in 1911, the army guardian, Major James B. Hughes of the First Cavalry, advocated the extension of the bounds: "Practically all the new territory that would be required is now in the national forest, is of little value commercially, and of great value as a park reserve. Its natural beauties are great and varied, there is comparatively little deeded land within the indicated boundary, it forms a natural game preserve, and within this extensive area game of all kinds should prosper and increase rapidly. . . . Also within this proposed area there are some of the finest trout streams in the world."

In recent years a determined effort has been made to persuade Congress to take action in establishing this greater Sequoia National Park, culminating in the proposal to make it a memorial to the late President Roosevelt. One by one objections have been overcome until at last the way seems almost clear for final success. The sheepmen have been driven from the scene; the cattlemen have become satisfied that they are not seriously affected; the lumbermen find that they have no holdings within the proposed boundaries; the irrigationists see a positive advantage in the additional security of their water supply; the miners have abandoned hope of ever finding anything to mine; the National Forest Service and the National Park Service have come to an agreement as to the proper boundaries; and finally the water power companies have declared themselves out of the field for the reason that they can find no sites that they consider of economic value for this generation at least. The verdict would be unanimous in favor of the enlarged park if it were not for the claims of the municipal power bureau of Los Angeles, whose engineers have gone far afield in search of all possible sites no matter how remote or unpromising. The arguments in favor of their power scheme are so slender and the arguments against it so strong that it is not likely to stand long in the way of a matter of such inestimable benefit to the whole country as the establishment of this great recreational area as a national park. For, after all, this region has a very positive character that is bringing people to it every year in increasing numbers, seeking recreation and inspiration. Here one may live happily out of doors all summer long, giving little thought to protection. Storms are infrequent and of brief duration; the days are neither too hot nor too cold; and the nights, though cool, are rarely chilly. With so few drawbacks there is abundant opportunity for enjoying the attractions of nature, both animate and inanimate.

The scenery offered by the eleven hundred square miles of the proposed park is uniformly magnificent. In the writer's estimation it is unsurpassed in the United States for grandeur of form and for delicacy of texture. It lacks the brilliantly colored rocks of the Yellowstone Cañon or of the cañons of Utah, but the many deep blue, alpine lakes with the blue sky overhead, and myriads

of bright wild flowers all about, give color enough to satisfy any mortal. The great cañons of the Kaweah, the Kern, and the Middle and South forks of the Kings; the varied peaks of the Great Western Divide; the rounded heights of the Monarch Divide; the extraordinary domes of Moro Rock and Tehipite; and above all the Sierra crest, extending for miles along the eastern border of the park, present a panorama of indescribable majesty.

A list of mountain altitudes in the United States shows fifty-six peaks over 14,000 feet in elevation. Of these, forty-two are in Colorado, one in Washington, and the other thirteen in California. Ten of the California peaks are within the proposed Roosevelt-Sequoia National Park, including the highest of all, Mount Whitney (14,501), the highest point in the United States outside of Alaska. The others are: North Palisade (14,254), Russell (14,190), Sill (14,100), Split Mountain (14,051), Middle Palisade (14,049), Langley (14,042), Muir (14,025), Tyndall (14,025), and Barnard (14,003). The figures are from the United States Geological Survey topographic maps. Many peaks of slightly less altitude are equally impressive and afford varied opportunities for mountain climbing. Of these the more prominent are the Kaweah Peaks, Brewer, Stanford, King, Gardner, and Goddard.

Camping in the Sierra Nevada invariably produces a thirst for knowledge. One can identify the seasoned camper by the number of branches of natural science in which he is actively interested. At first perhaps geology grips him. He wants to know how the cañons were formed and why the mountain tops are shattered. Then he wants to know how to distinguish the pines or how to name the flowers. He discovers that there are many more animals and birds in the mountains than he at first supposed.

The region is a fascinating field laboratory for the study of geology, particularly in respect to granite structure and the effects of glacial action. Beginning with the work of the California State Geological Survey under Josiah Dwight Whitney in 1864, when William H. Brewer led a field party into the Kings River region, extending through the explorations of John Muir and the critical observations of Grove Karl Gilbert and Andrew C. Lawson, down to the recent topographic work of the United States Geological Survey, this section of the High Sierra has been of unfailing interest to scientists. In 1881 S. P. Langley conducted on the summit of Mount Whitney a series of experiments on solar heat, and in 1909 Mount Whitney was the seat of a meteorological observatory for the Smithsonian Institution.

The High Sierra is not a region of big game. Indeed the number and variety of large animals is comparatively small for such a wild country. The principal game animal is the Rocky Mountain mule deer (*Odocoileus hemionus hemionus*). The Sierra mountain sheep (*Ovis canadensis sierræ*) was undoubtedly common before the domestic sheep and the hunter rendered it almost extinct. A few years ago a small band was seen within the park area and it may be possible to restore this animal to its native slopes. The grizzly bear (*Ursus horribilis californicus*) was once at home here, but he is now completely and inevitably extinct. The black bear (*Ursus americanus altifrontalis*), however, survives, for he is able to get along better with his neighbors. Fast going the way of the grizzly is the mountain lion or cougar (*Felis oregonensis oregonensis*). The lynx or wild cat (*Lynx eremicus californicus*) is also found, but is not much in evidence. The large mountain coyote (*Canis latrans lestes*) is here and is sometimes mistaken for a wolf. There are no wolves in the Sierra, however. The High Sierra red fox (*Vulpes necator*) is found on the Kern plateaus.

The lesser mammals are more abundant. Squirrels, chipmunks, chickarees, and ground squirrels are ubiquitous. The Sierra marmot (*Marmota flaviventer*) is common in the rock piles at the stream sources. He has a very interesting neighbor in the cony or pika (*Ochotona albatus*). Another interesting animal is the Sierra snowshoe rabbit (*Lepus campestris sierræ*). Martens, weasels, badgers, fishers, skunks, and wolverines are natives of the region.

Many common birds are found, but even a list would be too long here. The most distinctive of the conspicuous birds are: the golden eagle (*Aquila chrysaëtos*), the Clark nutcracker (*Nucifraga columbiana*), the Sierra grouse (*Dendragapus obscurus sierræ*), the pileated woodpecker (*Phlœotomus pileatus abieticola*), the mountain bluebird (*Sialia currucoides*), and the water ouzel (*Cinclus mexicanus unicolor*). John Muir has made the water ouzel immortal by his chapter in *The Mountains of California*. Climbers of the high peaks will find another remarkable bird, the gray-crowned rosy finch (*Leucosticte tephrocotis tephrocotis*), fluttering about at the very highest altitudes, even up to 14,000 feet.

The Kern River region is remarkable for the variety of its trout. Here is the only native source of the golden trout, of which there are three species all originating in a small area: the Soda Creek or White's golden trout (*Salmo whitei*), the South Fork of Kern golden trout (*Salmo agua-bonita*), and the golden trout of Volcano Creek, or Roosevelt trout (*Salmo roosevelti*). The Roosevelt trout is described by Evermann as follows: "This is the most beautiful of all the trouts: the brilliancy and richness of its coloration is not equaled in any other known species; the delicate golden olive of the head, back, and upper part of the side, the clear golden yellow along and below the lateral line, and the marvelously rich cadmium of the under parts fully entitle this species to be known above all others as *the* golden trout."[1]

There is one other species of trout native to the park, the Kern River or Gilbert trout (*Salmo gilberti*). This is a handsome fish of the rainbow series, found in the main Kern River. Most of the streams and lakes of the proposed park have been stocked with these and other species of trout, including the rainbow trout (*Salmo irideus*) and the eastern brook trout (*Salvelinus fontinalis*).

These are but some of the features of the proposed Roosevelt-Sequoia National Park. Splendid trees and brilliant flowers adorn the scene, butterflies flicker in the meadows, lizards bask on wayside bowlders, roaring streams plunge down choked watercourses or fall in graceful cascades over dark ledges, snowfields gleam in vast amphitheaters; and as the long summer afternoon comes to a close, the rays of the declining sun transfigure the mountains with purple and gold. Night falls, and the camp fire throws its flickering light over trees and rocks; moonbeams touch with silver the pinnacles of neighboring cliffs.

[1] Barton Warren Evermann: "The Golden Trout of the Southern High Sierras," *Bulletin of the Bureau of Fisheries* 1906.

Photograph by Frederick H. Morley

A glimpse of the yellow pine forest of the Sierra

THE FORESTS OF THE ROOSEVELT-SEQUOIA NATIONAL PARK

BY

ANSEL F. HALL*

JOHN MUIR considered the coniferous forests of the Sierra Nevada to be the grandest and most beautiful in the world. He was well qualified to speak, for his travels took him to all of the great forest regions of North and South America, Asia, Africa, and Australia.

The main forest belt of the Sierra lies for the most part below the region of the proposed Roosevelt-Sequoia National Park, but small areas containing specimens of almost all the Sierra trees are to be found within the contemplated boundaries. The Giant Forest region of the present Sequoia National Park contains some of the most magnificent specimens of the larger pines and firs to be found anywhere in the range. The Sierra forest is entirely different both in general appearance and tree species from the northern woods and the eastern woodlands. Of the thirty-five or forty species which make up the forests of the Park, not more than a dozen are exceedingly abundant. There is little undergrowth in the higher elevations and, topography permitting, one may ride or walk at will through the forest without the need of trails or of an ax to clear the way.

The appearance of the Sierra Forest varies with great regularity in accordance with the altitude of the country; in fact, the mountaineer comes to speak of being in the main timber belt, the red fir belt, or the timber-line belt, and gauges his elevation with considerable accuracy by the species and character of the trees. Of course these belts merge into one another, and on steep slopes they may be displaced downward or upward by a north or south exposure, but at each

*Park Naturalist, Yosemite National Park

successive altitude a certain forest type predominates.

Approaching the Sierra from the west one crosses the vast, semi-arid plain of the San Joaquin Valley, which supports a few drought-resisting oaks. In the foothills the valley live oak is joined by the blue oak and the buckeye and (except in a broad belt near the Kaweah River) by the silvery gray, many-branched digger pine. Along the streams at these elevations one will find the alder, cottonwood, western sycamore, and California laurel.

At altitudes of from 3000 to 5000 feet, varying with the slope and exposure, the foothill forest suddenly gives place to the main timber belt of the Sierra Nevada. The first trees encountered are the western yellow pine and the incense cedar, and a little higher these are joined by the sugar pine and the white fir; in favored localities are also the flowering dogwood and the giant Sequoia. Farther north, where the western slope of the range is more gentle, this magnificent forest belt is many miles wide, but here in the south the abrupt slope makes the strip considerably narrower. It widens, however, to take in the whole plateau upon which we find Giant Forest and also follows eastward up the main cañons, but for the most part it lies west of the boundaries of the proposed park.

Gradually the pines become fewer until at about 7500 feet they disappear and the white fir is joined by its relative the red fir. Pure forests of this latter species on the slopes and dense stands of lodgepole pine, or "tamarack," on the flats characterize the typical mountain forest belt. Bordering the high meadows we often find the beautiful little quaking aspen, and the western white pine (or mountain pine) becomes common among the red fir of the higher elevations. Junipers often dot the exposed rocky slopes and struggle upwards almost to timber line.

In this region timber line lies at an altitude of 11,000 to 12,000 feet, and the upper thousand feet of parklike woodland is known as the alpine forest belt. At its lower limit are gnarled dwarfs of "tamarack," western white pine, and red fir, and now and then a mountain hemlock. But the hardiest warriors in the battle with the elements are the foxtail pine in the south and the white bark pine in the north. What explorer of the higher regions has not admired their pluck and sturdiness as they appear to toil upwards, prostrate against the ground perhaps, but still fighting!

The oaks of the lower elevations and the moisture-loving, broad-leafed trees which border the streams in the deep cañons form a very small proportion of the Sierra forests. By far the most important in every way are the conifers, and whoever spends any time in this region comes to know these evergreens and to greet them with friendly recognition. Much has been written about them and much remains to be told; here only brief mention can be made of the more abundant and remarkable species.

The Big Tree (*Sequoia gigantea* or *Sequoia washingtoniana*) is the oldest and largest of all existing trees. The mightiest specimen, "General Sherman," stands in Giant Forest in Sequoia National Park. Its diameter is $36\frac{1}{2}$ feet at the ground and $27\frac{1}{2}$ feet twelve feet above the ground; the height is $279\frac{9}{10}$ feet. The age of the giant Sequoia has been frequently overestimated, but the longevity of some specimens has been accurately determined to exceed three thousand years and in all probability the oldest approach four thousand. This is sufficient to give the species the distinction of being the oldest living thing. The Big Tree is found in groves along the western slope of the Sierra Nevada at altitudes varying from 4800 to 8000 feet, the elevation increasing toward the south. Professor Willis Linn Jepson, the leading authority on the trees of California, lists thirty-one distinct groves and another was discovered in the summer of 1921. Of these the largest is

Photographed by Ansel F. Hall

A timber forest on Mount Guyot. In the distance is the crest of the Sierra, the eastern boundary of the proposed park. The streams of this region are the home of the golden trout

Photographed by Ansel F. Hall

A typical forest of the high Kern Plateau. Mount Whitney, 14,501 feet in height, dominates the landscape

Giant Forest in Sequoia National Park. The proposed boundaries of the Roosevelt-Sequoia National Park include, besides the Giant Forest, several other groves of big trees, some of which are a part of the Boulder Creek Grove, between Boulder Creek and the Kings River Cañon; the North Kaweah, or Muir Grove, near Dorst Creek in the present Park; and the Redwood Meadow Grove, just east of the present boundary of Sequoia National Park on the Middle Fork of the Kaweah River near the junction with Cliff Creek. This last grove, containing two hundred eighty Sequoias, is on patented land but has not so far been cut for lumber. Steps are being taken by public-spirited citizens to purchase this land and timber for restoration to the national domain, as it is far more valuable for recreational purposes than for the lumber necessities of the vicinity.

The proposed enlargement will exclude two other important groves in Sequoia National Park. These are the Atwell's Mill Grove, on the East Fork of the Kaweah River, and the Garfield Grove in the cañon of the South Fork. There are also two groups of minor importance. The Atwell's Mill Grove was recently purchased from its owners by private subscription and presented to the national domain through the Department of the Interior. Since it is the policy of the Forest Service, into the custodianship of which these groves will pass, not to permit the cutting of any big trees under its jurisdiction, the Atwell's Mill Grove and the Garfield Grove will be saved from destruction even though not included in the Park.

Next to Giant Forest the largest groves are the Redwood Cañon Forest, situated just north of the present boundaries of Sequoia National Park, and the Converse Basin Forest, between General Grant National Park and the Kings River. These are both privately owned and may be cut for lumber. The Redwood Cañon Forest is still practically untouched, but the Converse Basin district presents a most desolate appearance. Just east of Converse Basin logging is now going on in the Boulder Creek Grove, much of which is privately owned. There are still some fine stands of big trees near Boulder Creek which might be saved, but they are outside of the proposed boundaries of the Park and the amount of money required to purchase them is too large to be expected from private sources. It is safe to predict for this region that before many years all, save the few trees which are on government land in the national forest, will have been destroyed. South of the present boundaries of Sequoia National Park are a number of very fine groves, some of which are in the national forest and others privately owned. One of the best is known as the Tule River Forest. These southern groves have not yet been seriously encroached upon, but their future is still to be determined.

Second in interest to the Big Tree is the sugar pine (*Pinus lambertiana*). This, the world's largest pine, attains a maximum height of about 200 feet, but ordinarily does not exceed 150 or 175 feet, with a diameter of from 4 to 12 feet. The features that most attract attention are the beautiful red bark, the long, graceful branches extending at right angles to the trunk near the top, and the remarkable, large, feathery cones, which hang from the ends of the branches and are found strewn over the ground beneath.

The sugar pine occurs within the limits of the Roosevelt-Sequoia National Park in considerable numbers in the Giant Forest region and also in a belt along the sides of the Kings River Cañon and other gorges. There are some magnificent specimens in the neighborhood of Tehipite Valley, and one of the finest cañon views in the mountains, that from the Tehipite Trail looking up the Middle Fork Cañon, is enhanced by a foreground of the picturesque branches of sugar pines with their cone tassels. But the sugar pine is not a high mountain tree,

and throughout the greater part of the Roosevelt-Sequoia area it is not to be found.

Closely related to the sugar pine is the western white pine (*Pinus monticola*), also known as the mountain pine or silver pine. This is a very common tree in the Northwest, where it is cut extensively for lumber, but in the Sierra it occurs only at high altitudes, forming parklike and somewhat stunted forests. In the Roosevelt-Sequoia region the species grows at elevations of from 8000 to 11,000 feet and is one of the trees most frequently encountered on the high mountain slopes.

The two other white pines of the region occur at timber line. One of these, the foxtail pine (*Pinus balfouriana*), is the dominant tree at upper elevations in the present Sequoia National Park and southward. It is particularly abundant on the high plateaus of the Kern. It can readily be distinguished by the "foxtail" character of the branch tips, the bushy foliage of which is made up of short, five-needle bundles.

In the northern part of the Roosevelt-Sequoia Park area we find the whitebark pine (*Pinus albicaulis*) replacing the foxtail pine of the south. This inhabitant of the bleak upper slopes shelters the camp of many a mountaineer and provides deep, soft beds of needles, which are the delight of the tired knapsacker. The five-needle bundles, the smooth, white bark on the flexible branchlets and on the young trees, and the small, hard, purple cones are marks for easy distinction.

The two yellow, or three-needle, pines to be found in this section of the Sierra are the western yellow pine (*Pinus ponderosa*) and the Jeffrey pine (*Pinus jeffreyi*). These noble trees raise their domelike crowns almost as high as those of the sugar pine and are indeed fit companions to that patriarch of the pine family.

Probably the most widely distributed tree in the territory of the proposed park is the lodgepole pine, or "tamarack," (*Pinus contorta*).[1] This tree forms the most extensive forests of the region and has the widest range. Climbing upward the mountaineer always welcomes it as announcing his arrival in the High Sierra. It may be found between the altitudes of 5500 and 11,500 feet, but grows most abundantly at about 9000 or 10,000 feet. Besides bordering streams, lakes, and mountain meadows, this hardy pioneer struggles upward in the most inhospitable places almost to timber line. The tree is extremely variable in appearance. The best specimens stand straight and well formed to the occasional height of one hundred feet; stunted and Japanesque dwarfs lend great charm to many miniature glacial lakes; and on exposed rocky points a rugged sturdiness is developed akin to that of the juniper. No one who has slept on the ground in any part of the Sierra can forget the little, burlike cones of the "tamarack." A large proportion of Sierra bivouacs are made beneath this tree, and the first duty in preparing a bed is to brush out all the little cones. And yet, no matter with what care the bed has been prepared, the sleeper is frequently awakened in the middle of the night by the prod of a little knob, and he will not sleep again until he has picked out this one last cone which seems always to be overlooked. The flaky, purplish bark, the small size, the short needles, and the small cones serve as marks of easy distinction. The lodgepole pine is of practically no value for lumber, as it is too small and grows in inaccessible regions.

A most interesting pine, which normally occurs on the semi-desert slopes of the Owens Valley many miles to the eastward, is the one-leaf piñon (*Pinus monophylla*), which grows abundantly in a very limited area in the vicinity of Mist Falls near Kings River Cañon and

[1]The name "tamarack" is used locally in the Sierra Nevada. The tree to which it is applied is a wholly different one from the true tamarack of the eastern United States.

is found in a few other isolated situations on the western slope. The large nutritious nuts of this small tree were prized by the western tribes of Indians as well as by those east of the range and were often obtained from the latter in exchange for acorns. Doubtless the few exotic groves found on the western slope sprang from seed dropped (or perhaps planted) by the aborigines.

There are five other cone-bearing trees in the region: the red fir, white fir, and hemlock, which belong to the pine family; and the incense cedar and juniper, which represent the cypress family. The slender, symmetrical spires of the white and the red firs add greatly to the beauty of the mid-Sierran forests. The fact that their cones stand erect on the topmost branches distinguishes them from all other Californian evergreens. Both trees are exceedingly beautiful, especially in their younger life when the light, graceful branches stand out in regular whorls from the silvery white trunk. The white fir (*Abies concolor*) prefers the lower altitudes; the red fir (*Abies magnifica*) grows abundantly above 8000 feet, mingling with the lodgepole pine and western white pine.

Among the most graceful of Sierran species is the mountain hemlock (*Tsuga mertensiana*), which is a timber-line tree from Alaska southward. Within the boundaries of the proposed park it is rather scarce, making its southernmost appearance at Bubbs Creek far above the Kings River Cañon. The drooping of the tip and the ends of the branches are characteristic of no other native conifer and make the tree easily recognizable from afar.

The incense cedar (*Libocedrus decurrens*) is one of the commonest trees of the middle altitudes. It thrives best with the western yellow pine at altitudes of from 4000 to 7000 feet, where its stringy, yellowish to cinnamon-brown bark is sometimes mistaken for Sequoia by uninformed observers. The spicy fragrance of the heartwood and the pungent odor of the foliage make the common name of this tree quite appropriate.

A picturesque inhabitant of the rocky upper slopes is the western juniper (*Juniperus occidentalis*). Its gnarled habit and bleak surroundings make it the very emblem of strength and resistance, and give it a personality possessed by few other trees. The fibrous, brown bark is exceedingly thin and continuously flakes off in strips. The minute leaves are scalelike and closely pressed to the round branchlets. The small, round, bluish fruits are really modified cones but appear to be berries.

An interesting evergreen, though not a conifer, is the California nutmeg (*Tumion californicum*). Its sharp-pointed, needlelike leaves give it somewhat the appearance of a fir, but the fleshy fruits which hang from the branches like plums prove it to belong to another family. This small tree is nowhere exceedingly abundant, but specimens may be found in the lower reaches of many of the cañons.

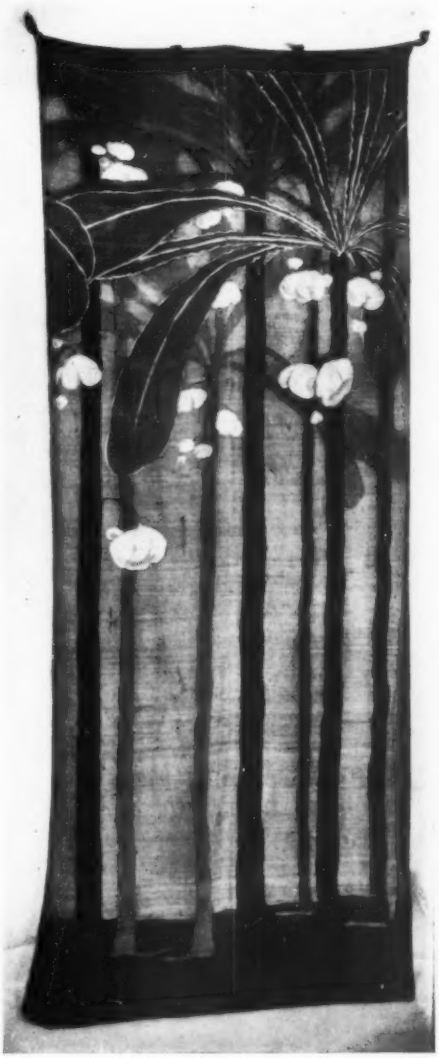
This list, necessarily incomplete, gives some indication of the forest riches of the existing Sequoia National Park and of the larger area to be embraced by the proposed park.

FLORAL DESIGNS IN TEXTILES

PLANT MOTIFS BASED ON STUDIES MADE BY MISS ANNA HEYWARD TAYLOR AT KARTABO, BRITISH GUIANA

FROM of old, man has shown a desire to introduce into his decorative designs suggestions of the flowers that delight him in nature or that have become intertwined with his spiritual life. The "lotus" bloomed not only in the watered areas of ancient Egypt but was immortalized in stone on the columns supporting the temple roofs. The acanthus leaf is preserved for all time in the Corinthian capital. Even in our ultra-urbanized modern centers of population, there is still something in the pattern of the carpet we tread upon, or possibly in the upholstery of this room or that, suggestive of growing things. Yet in most floral designs there is so much matter-of-fact conventionality, so little appreciation of the structural significance and beauty of plant life that one turns with a sense of refreshment to work like that produced by Miss Anna Heyward Taylor, who has translated into textile designs the flowers which she has painted during her two sojourns at the Tropical Research Station of the New York Zoölogical Society at Kartabo, British Guiana. For several weeks in March and April of this year her textiles, including shawls, curtains, panel cloths, and even a gown, were on exhibition in the hall of forestry of the American Museum, together with a series of her paintings of plants.

It was while sketching in Provincetown that Miss Taylor made the acquaintance of Miss Rachel Hartley and her brother, Mr. Innes Hartley, who was interested in the work of the Tropical Research Station. In company with Miss Hartley and several others Miss Taylor went to the Station in 1916 for a sojourn of four months. There she found her opportunity for making decorative, as well as faithfully executed, studies of the tropical flora, much of which still requires identification. America's entry into the war prevented temporarily the resumption of the work at Kartabo but in May, 1920, she again visited the region and on this occasion made a stay of six months. She had, in the interval between her two visits, learned the process of Batik and had con-

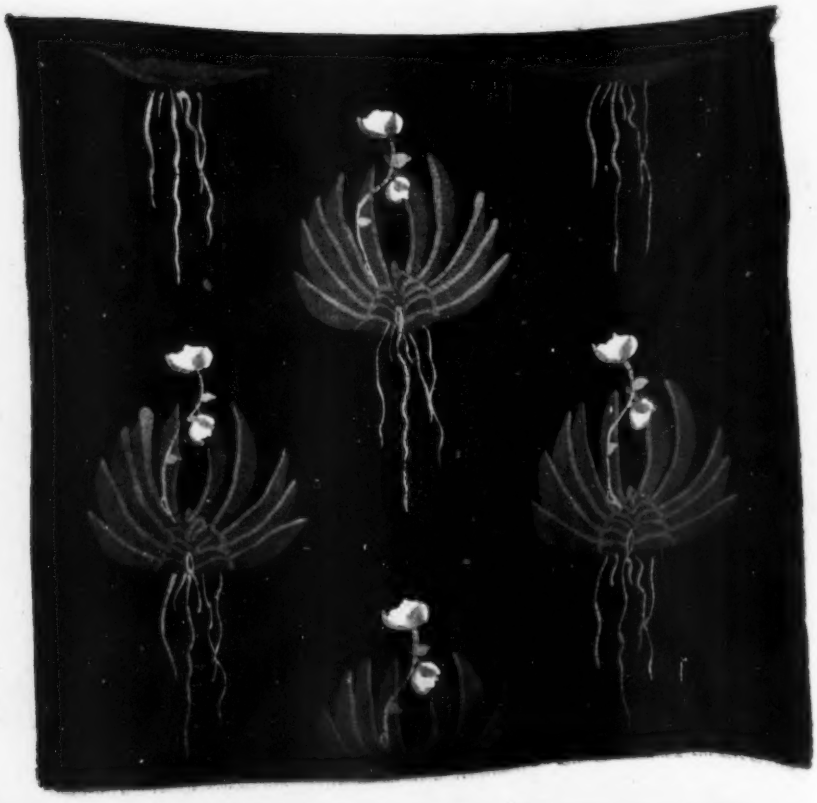


A curtain design having as its motif the tropical tree *Grias cauliflora*

ceived the idea of using the tropical flowers as motifs for designs in textiles.

Although originally a landscape painter, so successful was Miss Taylor in the new branch of art to which she had decided to devote herself, that her first three designs received honorable mention at an exhibition held at the Art Alliance. To-day her work has become so absorbing that, rather than divert a part of her energies to other tasks, she declined recently an offer of a teaching position in the New York School of Applied Design.

Miss Taylor's work as exhibited at the Museum illustrates the extent to which nature may be drawn upon in the search for novel and pleasing arrangements of form. A cross section of the fruit of a



An orchid copied from nature (upper picture) and used, practically unaltered, as a repeat design on a silk panel cloth (lower picture)

TYPES OF FLOWERS PAINTED BY MISS ANNA HEYWARD TAYLOR AT THE TROPICAL RESEARCH STATION OF THE NEW YORK ZOÖLOGICAL SOCIETY, KARTABO, BRITISH GUIANA

tropical plant, the *Marcgravia*, furnishes one of the spectacular designs. A cross section of a Dutchman's pipe is perpetuated in another. In her earlier work as a landscape painter, Miss Taylor had given her attention to the larger features of things, with comparatively little emphasis upon details. Her present work has necessitated a reversal of this technique for it has involved at times the reproduction of objects seen to advantage only under a high-power microscope. An example of this is a design based upon a cross section of a piece of wood, the cells of which form a delicate pattern.

Not only plants but insects, too, have given suggestions of form and color. The design of one of the textiles was suggested by the markings on the sedately colored underside of the wing of a *Morpho*, so strongly in contrast with the bright, metallic blue of the upper side of this butterfly's wing, yet in its way just as beautiful. In the case of another design, the nymph of a katydid was the very element needed to carry out the artist's conception.

As one approached the exhibit the first thing to attract the eye was a decorative curtain having as its motif the tree, *Grias cauliflora*. This tree has a crown of leaves from three to four feet long, radiating from the top of the stem, and on the dark, slender trunk, which in nature attains a height of about thirty feet, grow clusters of heavy, white flowers that droop gracefully. One of the most beautiful of the textiles is a shawl into which have been combined as elements of the design the wild cocoa bean and the *Moronobea* with its bright red clusters of flowers. The adaptability of certain plants to decorative use in textiles is well illustrated by the almost literal transfer to the silk background of an orchid, practically as it was recorded from nature, even to the slant of its roots. This flower is used as a repeat and the result is a design that is simple, truthful, and pleasing.

While emphasis has been laid on the textiles, to which most space was given in the exhibit, many visitors must have been equally impressed by the original paintings of plants. The fidelity of these paintings, the appreciation of form and tint which they reveal, assure them high rank among Miss Taylor's productions.

A branch of the wild cocoa bean, one of the motifs employed in the shawl

The clustered red flowers of the *Moronobea* also figure in the design

SCHOOL COURSES VITALIZED BY THE AMERICAN MUSEUM

HOW THE WORK OF VISITING CLASSES GAINS ADDED SIGNIFICANCE

BY

GRACE FISHER RAMSEY*

GEOGRAPHY and history are proving unusually interesting this term to the pupils of the 6-B Grade of a public school in Manhattan. Their teacher obtained permission from the principal to bring the children to the American Museum every Friday afternoon, and the department of education of the Museum, by preparing an outline of topics which followed closely the course of study prescribed for the grade, has unlocked for them such a wealth of material relating to their studies that the dry facts of the text books have taken on real life. For example, most children learn in their geographies that coal mining is one of the principal industries of Pennsylvania. They may read that coal is dug from the ground and that there are cars which bring it to the surface, but that is about the limit of their knowledge.

Through the aid of the Museum the girls in the grade mentioned have had facts presented to them in a more vivid way. When Pennsylvania was the subject of their geography lesson, they came to the Museum and were taken by their teacher to a small lecture room set aside for their use. Here were shown them, by means of stereopticon slides supplied by the Museum, restorations of the plants growing during the Coal Period and the different steps in the process of coal mining. The lecture over, a trained guide from the department of education of the Museum conducted both teacher and class to the exhibits bearing directly upon the topic. They were shown the fossil plants found in the coal measures and the various kinds of coal that are mined. They learned by actual comparison the differences between bituminous, cannel, and anthracite. They saw the hundreds of coal-tar products and learned how the black coal furnishes us with our most brilliant dyestuffs and many of our pharmaceutical products.

The preparation of material required for such a lesson demands a long period of time. The securing of specimens and the mounting of the exhibits, the taking of the photographs, the making of the lantern slides, the shaping of the manuscript for the teacher's lecture, and the training of the guide, represent a vast amount of work and resources completely beyond the reach of any school. Yet all these facilities were made so easily available to the class that probably not even the teacher herself realized fully what had been done for her pupils.

Thus far the class has learned not only about coal mining, but also about our forests and their uses, not by a dull text book study but by seeing with their own eyes and feeling with their own hands the wood and bark of the giant Sequoias and the other native woods in the forestry hall. They have studied the early history of New York in the Indian hall, examining the wampum belts, seeing the very clothes that the Indians wore, the food they ate, and the implements they used. They know the Indians who live in the Southwest, the terraced homes that many of them build, the blankets woven by the Navajo, and the baskets designed by the Pima. They know the Grand Cañon not only from the beautifully colored lantern slides but also from the model in the geology hall.

This is just one instance of the way in which the Museum is coöperating with the schools of New York. It is an example of the possibilities of correlating the work of the classroom with the work of the Museum. It is merely the systematic use of the facilities that are available to any group of pupils and shows the advantages of such study.

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NOTES

NEW MUSEUM BUILDINGS

THE work that the American Museum is accomplishing as an educational force in the life of the nation has been recognized in a substantial manner by the Board of Estimate and Apportionment, which, in authorizing sums for the erection of new buildings that were sorely needed, has provided facilities for the housing and exhibition of the Museum's growing collections and for the intensifying of its work among the public schools. In an article of this issue, pp. 113-15, the projected School Service Building of the American Museum is described. The erection of two other buildings has also been made possible through the action of the Board of Estimate and Apportionment, which on December 28, 1921, voted the sum of $1,500,000 for the construction of a Southeast Wing (Asiatic Hall) and a Southeast Court building (Hall of Ocean Life).

The Southeast Wing will be erected to a height of five stories. The first floor will be designated the hall of fishes and will contain not only the exhibits at present on view in different parts of the Museum but many projected additions. The second floor will be occupied by the mammals of Asia, of which a large collection has been made by the several expeditions of the Museum to that continent and which are being added to substantially by the present expedition under Mr. Roy Chapman Andrews. The hall of recent reptiles will be located on the third floor, and on the floor above that will be exhibited the great extinct reptiles, exclusive of those that belong to the Cretaceous, which will continue to occupy the present hall of dinosaurs. The fifth floor will offer an opportunity for the expansion of the crowded scientific and administrative offices.

The Southeast Court building will be devoted to the depiction of marine life. Under the broad gallery that is contemplated will be arranged the habitat groups of seals, walruses, sea elephants, and other creatures that live in the salt waters. A reproduction of a beautiful coral reef will find place among these exhibits. Along the gallery will be placed the marine invertebrates with special attention to the shells and corals, and from the ceiling will be suspended the skeletons of large whales. The lunettes of the building will be occupied by frescoes presenting the history of the whaling industry and other topics connected with the ocean.

In addition to these liberal provisions the Board of Estimate and Apportionment made an appropriation of $110,975, on April 10, for the installation in the American Museum of exhibit and storage cases and a 500 *kw.* dynamo.

NATIONAL ACADEMY OF SCIENCES

THE annual meeting of the National Academy of Sciences was held at the United States National Museum in Washington, April 24-26. In the afternoon session of April 24 a joint paper by President Henry Fairfield Osborn and Dr. C. A. Reeds, of the American Museum, entitled "Recent Discoveries on the Antiquity of Man," was presented by President Osborn. During the same session Dr. Frank M. Chapman, curator of ornithology, read a paper he had prepared on "The Distribution of the Motmots of the Genus *Momotus*," and in the afternoon session of the following day presented by title "A Biographical Memoir of Dr. J. A. Allen." The evening session of April 24 was given over to an address on "Problems of Modern Physics," delivered, under the joint auspices of the Carnegie Institution of Washington and the National Academy of Sciences, by Dr. H. A. Lorentz, professor of physics at the University of Leiden, the address being followed by a reception tendered to Dr. and Mrs. Lorentz.

THE MORGAN MEMORIAL HALL

THE Morgan Memorial Hall of Minerals and Gems, presented to the city of New York by Mr. George Fisher Baker, in memory of his friend, the late John Pierpont Morgan, was formally opened on Monday, May 1, President Henry Fairfield Osborn delivering a short address at the reception held for the trustees and the members of the Museum in the evening. Through Mr. Baker's public-spirited act in authorizing the complete reconstruction of the hall at his expense, the mineral and gem collection, one of the largest and most valuable in the world, has a setting worthy of its quality. The new hall, the work of Trowbridge & Livingston, is of basilica type with a nave and two aisles surmounted by barrel vaults, the penetrations being supported on marble piers. This vaulted treatment of the ceiling offers good opportunity for the introduction of mural decorations illustrating the evolution of mineralogy. The walls and ceiling are of imitation caen stone, blending well with the cream colored marble of the piers. No more fitting memorial could have been erected to Mr. Morgan, whose gifts of gems and gem material, including the splendid Bement collection of minerals and meteorites, constitute so important a part of the exhibit of the American Museum.

GROUP INSURANCE AT THE MUSEUM

THROUGH the generosity of the trustees of the American Museum and through the energy of the committee in charge of the negotiations, consisting of Professor Henry Fairfield Osborn, Mr. Felix M. Warburg, Mr. H. F. Beers, and Mr. George N. Pindar, there was consummated on April 12 an arrangement with the Metropolitan Life Insurance Company, whereby 252 employees of the American Museum, representing a large majority of those employed by that

The Morgan Memorial Hall of Minerals and Gems, American Museum

institution, will have the protection of group insurance.

Under the plan arrived at—a plan which was submitted to each employee individually with the privilege of acceptance or rejection as applied to his case—the employee contributes through monthly deductions from his salary an amount equal annually to one half of the required premium; the trustees pay the completing half.

Employees who have been in the service of the Museum for three months but less than one year have been privileged to insure for the amount of $500; those who have been in the service for one year or more, for an amount equivalent to their annual salary, but in no case for more than $5000.

The total insurance assumed by the 252 employees who signified their desire to participate is $504,540 and the average cost per thousand is $15.83. One of the attractive features of the plan is that an employee retired from service on pension can continue his insurance at the same rate as that available under the group insurance.

THIRD ASIATIC EXPEDITION

Mr. Roy Chapman Andrews, leader of the American Museum's Third Asiatic Expedition, has recently sent to President Henry Fairfield Osborn for approval a series of water-color sketches of Chinese reptiles and amphibians made from living specimens secured by the expedition. This first glimpse of the scientific illustrations that are being made in the field is most satisfactory. It is fortunate that the services of Mr. Wang, a Chinese artist, were secured for the work. The primary requisite of a scientific drawing is accuracy of details, whether these be of form or of color. An artistic representation emphasizes light and shadow, often to a sad neglect of details. The familiar quaintness of all Chinese art is due to a lack of molding, or handling of shadow, a substitution of receding planes for perspective, and above all, a masterly handling of the delineation. In short the mode of representation employed by the Chinese is admirably adapted for scientific illustration. It gives an exquisite quality to each illustration without the loss of color values due to excess shadows or substitution of effect for details. The illustrations submitted by the expedition are undeniably Chinese; they are also undoubtedly scientific illustrations of merit.

Many colors of reptiles and amphibians are modified in preserving. Thus blues and greens are darkened in formol, while reds are retained with their normal values. In alcohol, on the other hand, the reds and yellows are faded, while the brighter greens are seriously modified. Many experiments have been conducted to secure a preservative which would not modify the colors of the specimens, but no solution has been

found which it is practicable to use on such a large scale as is necessary in general collecting. It is very fortunate that the Third Asiatic Expedition of the American Museum is to have a permanent record of the colors of living reptiles and amphibians. The color sketches which have just been forwarded to the Museum are twelve in number. They include figures of the soft-shelled turtle (*Amyda schlegelii*), a beautiful pink and black snake (*Elaphe*), and a number of frogs and toads.

The reptiles and amphibians of China are extremely interesting and for a large part unknown. Asia has been the center of radiation for several primitive groups of frogs and salamanders. Today some of the most primitive of existing salamanders are found in China. If the Third Asiatic Expedition continues its work as successfully as it has maintained it during the short time in which it has been in the field, the American Museum of Natural History will have the largest collection of Chinese reptiles and amphibians in the world.

SOME time ago Mr. Gerrit Miller, of the United States National Museum, described a freshwater porpoise from the Tungting Lake, about 600 miles up the Yangtze River, Hunan Province, China. Although Mr. Miller had only the skull and neck vertebræ, it was obvious that the porpoise, which he named *Lipotes*, belonged to the family Iniidæ and exhibited many very primitive characters. This family was widely distributed in the Miocene and Pliocene but decreased rapidly in later geological times. The nearest relative of the Tungting Lake *Lipotes* is *Inia geoffrensis* of the Amazon and Orinoco rivers of South America. Since so little was known of the Chinese porpoise, Mr. Clifford Pope, of the Third Asiatic Expedition, who has been spending the winter in an intensive study of the Tungting Lake fauna, gave particular attention to obtaining a specimen of *Lipotes*. He was successful, and reports that he has water-color paintings made by his Chinese artist and complete measurements of the fresh specimen. Also he preserved the skeleton and all of the viscera in formalin. The thorough study which will be made of these parts should throw some important light on the evolutionary history of the cetaceans, because Mr. Miller's study of the skull and neck vertebræ demonstrated that it was almost a "living fossil."

Mr. Pope has also obtained several specimens of a black porpoise without a dorsal fin, which he has provisionally identified as *Neomeris Phocænoides*. Whether this identification will prove to be correct it is impossible to say until there has been an opportunity to examine the skeleton carefully.

THE Third Asiatic Expedition has had two very important gifts during the last winter. The United States Rubber Export Company has presented all of the tires and inner tubes necessary for the motor transportation on the expedition to Mongolia. The Standard Oil Company of New York has also donated 1200 gallons of gasoline and all the lubricants required for the cars. Since the use of automobiles in the remote parts of Mongolia will be somewhat of an experiment, it is particularly desirable to have all of the equipment of the very best. If the motor transportation is as successful as is anticipated, it will demonstrate what cars can do under difficult conditions and will be a "trail-breaker" for commerce as well as science. The advantages accruing from the use of automobiles are obvious. In Mongolia, which is a country of great distances, approximately two years' work can in this way be done in six months, for a motor car can cover in one day a distance as great as that covered by a camel caravan in more than a week.

The American Museum and the Third Asiatic Expedition are very appreciative of the generosity of these companies which have so substantially demonstrated their interest in the scientific work that is being pursued.

AUSTRALIA

WRITING from Ravenshoe, North Queensland, under date of January 31, Mr. H. C. Raven, the field representative of the American Museum in Australia, reports that he has thus far collected thirty-five species of mammals in Queensland and that he now has six hundred specimens of mammals. Australians, especially those connected with museums, continue to assist the expedition with every possible courtesy.

THE substance of the address on "Australian Mammals and Why They Should Be Protected," delivered by Curator W. K. Gregory, of the American Museum, before the Australian Museum, located in Sydney, appeared as an article over Dr. Gregory's signature in the issue for December, 1921, of the *Australian Museum Magazine*. The loss that will result to science if the extermination of this fauna continues is convincingly presented by Dr. Gregory, who points out that it is the most interesting in the world, and that it illustrates in a wonderful way the great principles of adaptive radiation and parallelism in development.

BURROUGHS AND MUIR

ON THE old home farm, near Roxbury in the Catskills, where John Burroughs grew up, there is a large bowlder of red sandstone, on which the poet-naturalist, when a boy, was wont to rest from work and play. It is this "boyhood rock," to use Burroughs' affectionate name for it, that was chosen, in fulfilment of his request, as his resting place when the work and play of a life-

time were over. Close by its side he was buried on April 3, 1921, the anniversary of his birthday, and there on April 3 of the present year was unveiled, under the auspices of the John Burroughs Memorial Association, a bronze tablet, the work of C. S. Paola, reproducing in bas-relief the heroic bronze of Burroughs sculptured by Paola's brother, C. S. Pietro, and called "The Seer." Ursula and John, the grandchildren of Burroughs, were chosen to draw the veil concealing the tablet, a ceremony accompanied by the playing of Pinsuti's "Remembrance."

At the conclusion of the readings which are specified below, the grave was strewn with laurel and other woodland growths sent by absent friends and with flowers which those present had brought with them. The names that follow in parentheses indicate the individuals who read the selections specified:

"John Burroughs," a poem by Charles Buxton Going, (Poultney Bigelow); "A Tribute to Our Townsman," a poem by Elizabeth S. Patterson (read by the author); Selections from "There Was a Child Went Forth" by Walt Whitman, (Shelley Crump); "Immortality," a poem by Grace Davis Vanamee, (Ralph Ives); Readings from Burroughs' *Wake Robin:* "The Bluebird," "The Vesper Sparrow," "The Hermit Thrush," (G. Clyde Fisher); "A Word from Scotland," a poem by T. Ratcliff Barnett, (W. O. Roy); "The Woodcocks are Calling in the Swamps Tonight," a poem by Louise Townsend Nicholl, (Olive Hinman); "The Wistful Days," a poem by Robert Underwood Johnson, (John Shea); April Selections from *Riverby, Signs and Seasons,* and *Birds and Poets,* (Adella Shea); "Come, April," a poem by John Russell McCarthy, (Dr. Clara Barrus); The Cradle Song of Brahms was then played.

Bronze tablet by C. S. Paola placed over the burial site of John Burroughs and unveiled on April 3. The inscription on the tablet is derived from John Burroughs' poem, "Waiting"

On the same day that the bronze tablet in honor of Burroughs, referred to in the previous note, was unveiled, two pin oaks were planted in front of the American Museum, the one to commemorate Burroughs, Lover of Nature, the other to honor Muir, the Friend of the Forest. After a few introductory words by President Henry Fairfield Osborn, of the American Museum, the trees were formally presented by Orlando Roulanld, and the gift in turn gratefully accepted on behalf of the Museum by President Osborn. Several children from Public School 188, Manhattan, officially known as the John Burroughs' School, were then introduced by Mrs. Ruth Crosby Noble, of the department of education of the Museum: Celia Grindell, who recited Burroughs' "Waiting"; Sylvia Schwartz, who had memorized the poem on Burroughs written by Helen Gray Cone in answer to "Waiting", and Sylvia Rosenberg, whose recitation was a passage selected by Mrs. Osborn, from John Muir's *Mountains of California.* The tree planting then followed, Mrs. Osborn casting the first spadeful of earth for the tree dedicated to Burroughs and Mrs. Rouland doing the like for the tree commemorating Muir.

The exercises were concluded with the singing, by the members of the Glee Club of Public School 188, of the John Burroughs' song, set to Rubenstein's "Melody in F." Temporarily there have been placed in memorial hall of the American Museum, in positions corresponding with those of the two trees, a portrait of Burroughs and a portrait of Muir, painted by Mr. Orlando Rouland—lifelike representations of two men who did so much to kindle in others the love of nature which they both felt fervently.

BIRDS

On April 8 Dr. Robert Cushman Murphy, associate curator of ornithology, American Museum, lectured at Western Reserve University on his Peruvian explorations; the same date Mr. James P. Chapin, assistant curator, lectured at Toronto before the Royal Canadian Institute on the Congo and its birds.

At the regular weekly staff meeting of the department of ornithology, held on April 20, Mr. S. Prentiss Baldwin, the leading exponent of bird-banding in the United States, who was the guest of the afternoon, spoke at some length

about the recently organized New England Bird-Banding Association and its formation, in which he had played a leading part.

FISHES

WITH the construction of the southeast wing of the American Museum assured, there is good prospect for the installation of certain exhibits that up to the present have been withheld from the public owing to the crowded condition of the existing exhibition halls. Among these is an "angler's collection," which will include noteworthy examples of fishes secured by rod and line.

A very important contribution to this collection has just been made by Mrs. S. W. Eccles, who has presented more than a dozen handsome specimens of Florida fishes obtained by her husband. These comprise, among others: a sail fish, 7 feet 10 inches long, a cobia weighing 62 pounds, an amber jack of 66 pounds, a kingfish (*Scomberomorus cavalla*) and a barracuda, each weighing 38 pounds, and a yellow jack (*Caranx bartholomæi*) of 17 pounds.

ARRANGEMENTS have been made whereby Mr. Henry W. Fowler, of the Philadelphia Academy of Natural Sciences, will assist in the identification of the fishes collected by the Third Asiatic Expedition of the American Museum. Mr. Fowler has made a study of the fresh-water fishes of the Far East and is an authority on those of the carp family, so largely represented in the lakes and rivers of China. He has examined the first lot of fishes collected by Mr. Clifford H. Pope, among which he found a new loach (a carplike fish).

FOSSIL VERTEBRATES

THE work which is being done for the U. S. Geological Survey in the department of vertebrate palæontology, American Museum, by Professor Henry Fairfield Osborn, Dr. W. D. Matthew, Dr. William K. Gregory, and Dr. C. C. Mook, has not been previously noted in NATURAL HISTORY, but in future numbers we hope to give some account of the nature and extent of two monographs—the *Titanotheres*, completed in 1920, and the *Sauropoda*, now nearing completion. The latter relates to the most gigantic reptiles that the earth has produced, which reached their climax in Jurassic time in such well-known forms as *Brontosaurus* and *Diplodocus*. In his Forty-first and Forty-second Annual Reports, Director George Otis Smith of the U. S. Geological Survey alludes to these monographs respectively as follows:

"The most notable paleontologic work completed during the year is a monograph on the Titanotheres, by Henry Fairfield Osborn, distinguished among world paleontologists and president of the American Museum of Natural History. This work is a product of a study begun nearly 20 years ago by the Survey and now completed under its auspices, with the coöperation of the American Museum of Natural History and the United States National Museum and through the courtesy of many other scientific institutions. This monumental work forms a milestone in the progress of paleontologic research in North America." (*Forty-first Ann. Rep.*, 1920, p. 52.)

"Among the more important reports in progress during the year that on the Sauropoda deserves particular mention. This monographic work, embodying the results of many years of research by Dr. Henry Fairfield Osborn, like that on the Titanotheres, is based in part on the early paleontologic explorations of the Western States, many of which antedate the present Geological Survey. These comprehensive and monumental monographs, requiring the learning of many paleontologists, have been prepared at relatively little cost to the Survey in recent years. Their continued progress is due mainly to the steadfast devotion to science of America's most distinguished paleontologist." (*Forty-second Ann. Rep.*, 1921, p. 26.)

MR. WALTER GRANGER, palæontologist of the Third Asiatic Expedition of the American Museum, has been engaged for some months past in explorations on the upper Yangtze-kiang, above the great gorge that forms so picturesque and dangerous a feature of its navigation between Wauhsien and Ichang. The following extracts from a letter recently received will be of interest to the readers of NATURAL HISTORY. It should be explained that one of the principal difficulties attending fossil collecting in China is that the fossil bones and teeth form a regular article of Chinese medicine and are to be found in all the druggists' shops. They are considered a sovereign specific for various disorders of digestion, heart affections, etc. In consequence the richest fossil deposits have been regularly mined by the Chinese for centuries, who are by no means willing to permit the "foreign devil" to come in and take what he likes, and perhaps exhaust their entire mine, without exacting from him adequate compensation. They would much rather work the deposits themselves and make sure that they get full value for the "dragons' teeth" and "dragons' bones" that with the prospector's usual optimism they feel sure must be there in inexhaustible quantities. In consequence, Mr. Granger has thus far had to rely chiefly on purchasing specimens dug out by the natives, with results which he finds exasperating. He writes:

"My work here is about ended for the season. I go on to Wauhsien on the twenty-third and shall start down river there four days later. The journey from Wauhsien to Ichang is all that bothers me now. This gorge trip, between the acts of God and of man, is always a hazard. I shall have a medium-sized junk and put all of my collections, equipment, and party aboard. There will be a crew of seven or eight to keep

steering headway in the current and with good luck we should make Ichang in four days. From there on it's all simple—steamboats and trains. . . .

"Native activities in the fossil pits are rapidly slackening up and hardly any new pits have been opened since the Chinese New Year (February 1). A few that were not completely worked out before that date are now being finished and I am, of course, keeping watch of these. The attention of the laborers is being turned to their fields, which are always of first importance to them as the source of their food. Crops have been growing all winter but have required very little attention. Now warmer weather is approaching, and cultivation and new planting will be required. . . .

"In another winter we can approach the work with better understanding than now, and can probably make some headway toward doing at least part of the excavating ourselves. To see some of these choice specimens broken up as they are irritates me beyond expression—i. e. polite expression. The most annoying thing is to realize that a fine tapir skull, broken into a hundred fragments, is just as valuable to the drug merchant as if I had taken it out intact myself. I have been in some pits recently and, while conditions for working are bad, yet the excavating can be done properly. The extreme toughness of the bones is a great thing in our favor.

"One observation I have made recently is that those pits which are low down on the eastern side of the ridge, especially those close to the bottom of the valley, are rich in *Stegodon* and *Rhinoceros*, while in the pits near the crest of the ridge the former is absent and the latter rare, their place being taken by numerous artiodactyls, especially a big cervid. *Stegodon* seems to have roamed this high valley in numbers but did not venture much into higher hills. The topography of this ridge has not, I think, changed greatly since these animals lived here.

"By far the commonest beast in the pits is a rodent, of which there seem to be two species, judging from size. . . . The skull of a monkey about the size of a gibbon is one of our latest acquisitions. . . . Skulls of *Sus*, two baby *Stegodon*, a big cat, and a fairly good tapir are among the things added since my last letter.

"Recently I took a five-day trip along the ridge toward the Hupei border—both interesting and profitable. I should have gone on into Hupei but my interpreter had to turn back because of illness after the first day and I was obliged to go on with just my Number One Boy, who handles English and firearms equally badly. It's perhaps just as well, for there are ugly rumors coming from that part of the province; a Catholic missionary was killed there last month and the "Joss Soldiers" are said to be on the move again. This is a particularly nasty corner of the country—the birthplace of much deviltry of one sort and another. . . ."

LOWER INVERTEBRATES

Dr. C. Montague Cooke, Jr., curator of Pulmonata at the Bernice Bishop Museum of Honolulu, visited the American Museum during the latter part of March, to resume his work on the collection of achatinellid land snails, which he has been identifying and revising for the department of lower invertebrates. During his stay he examined, identified, and rearranged the achatinellids of the Coan and Steward collections. Among the latter he discovered three specimens of the rare *Carelia hyathana* Pilsbry, of which only three other specimens are known to exist in museums. Doctor Cooke is one of the most eminent living authorities on the land mollusks of Hawaii and especially those of the family Achatinellidæ, regarding which his knowledge is unsurpassed. Through his courtesy the American Museum has been able to negotiate an important exchange with the Bishop Museum, with the result that a number of gaps have been filled and a fine series of paratypes and topotypes have been added to the collections of the American Museum. The beautiful, striped Hawaiian land mollusks known as the achatinellids form one of the most interesting examples known of variation under geographic distribution. In this respect they parallel in the Hawaiian Islands the distribution of the genus *Partula* in the Society Islands. The colonies of the achatinellids are very numerous and circumscribed, the color markings and proportions of the snails varying from colony to colony.

MAN

A Micmac Indian family group in plaster has recently been completed and placed in the birch-bark wigwam in the Eastern Woodlands hall of the American Museum. The figures comprising it, modeled by Mr. Frederick F. Horter of the department of preparation, represent in part an actual family. The man is a fair likeness of Little Bear, a Micmac now living in Philadelphia. The old woman was modeled from a photograph of Little Bear's mother, who, in the group, is supposed to be telling to her grandchildren one of the stories about Glooscap, the Abnaki creator,—stories which have delighted white children also as retold in *Indian Hero Tales* by Gilbert L. Wilson. The little girl of the group shows her interest by looking in the direction the grandmother is pointing. The father is resting after a day spent on a moose hunt.

Wigwams of this sort were built nearly everywhere that the canoe birch grows, the region embracing northern New England and eastern Canada.

Mr. Clarence L. Hay, research associate in Mexican and Central American archæology, American Museum of Natural History, has recently returned from a trip made to Mexico in company with Dr. A. V. Kidder of the department of archæology of Phillips Andover Academy. For several years Mr. Hay has been endeavoring

The Muskrat Group in the American Museum

to ascertain the extent of the so-called "archaic culture," which seems to have centered in the Valley of Mexico, and the present trip was for the purpose of continuing this study. Although less than two months elapsed between his departure and return, the trip yielded important results. In the vicinity of Mexico City were secured a number of hitherto unrecorded specimens of the archaic type, which will be of considerable value in classifying this culture. Potsherds were secured near Chalchihuites in the state of Zacatecas. Although none of these potsherds were closely related to archæological finds of the Valley of Mexico, being on the contrary of distinct type, a vessel with affiliations to the pottery of the Valley was dug up in the Casas Grandes region of Chihuahua. Mr. Hay is confident that in time the limits of the primitive culture of the Valley of Mexico will be determined but, as the objects on which such a determination must be based lie far beneath the surface of the ground, a satisfactory conclusion can be reached only after much intensive stratigraphic work.

MAMMALS

A HABITAT group recently installed on the second floor of the American Museum is that of the muskrats (*Ondatra zibethica*). The scene is a marsh near the mouth of the Eel River, Plymouth, Massachusetts, as viewed from the summer residence of Director F. A. Lucas, at whose suggestion and under whose guidance the group was prepared. The immediate foreground has been changed to adapt it for the purposes of the group, and the middle distance has been shortened; but in essentials the scene is unaltered. On the left of the group is shown in cross section the "house" of a muskrat, with passageway leading from below and the air chamber occupied by one of the brown-furred animals. The background was painted by Mr. Albert Operti; the accessories, assembling, and general preparation of the group were under the supervision of Mr. W. B. Peters; the animals were mounted by Mr. Paul Engel.

THE interior of a puma den is represented in another exhibit recently installed on the second floor of the American Museum. The scene is a rocky cave of our West, from which one looks out on the rugged hills, dark against the deep red afterglow of the setting sun. The puma mother and the hungry kittens have been aroused by the return of the male from the hunt. He is carrying in his jaws the limp body of a little fawn. On the floor of the cave are scattered here and there the cleaned bones of former victims. Three of the Museum's artists, working under the guidance of Director F. A. Lucas, have contributed to this effective group. The animals were mounted by Mr. Louis Jonas; the cave was made by Mr. Frederick Blaschke; and the background was painted by Mr. Albert Operti.

INSECTS

THE latest report upon the extensive collections of the American Museum Congo Expedition (1909-15), is a contribution to the knowledge of African ants by Professor William M. Wheeler, research associate in social insects, American Museum, with the collaboration of Messrs. J. Bequaert, I. W. Bailey, F. Santschi, and W. M. Mann. Parts I and II, by Professor Wheeler, have recently been issued and other parts are about to appear.

In Part I (pp. 13-37) the author discusses the peculiarities of the ant fauna of the Ethiopian region and Madagascar, pointing out the affinities of this fauna with that of other parts of the earth. Of the 269 known genera of ants the Ethiopian region possesses 90, being only slightly

surpassed in this respect by the Neotropical, with 97 and the Indo-Malayan, with 101 genera. Of the 90 Ethiopian genera, 34 are endemic, 48 of the remainder being also found in the Indo-Malayan region. The Ethiopian fauna, however, has only 22 genera in common with the Neotropical, a fact which is important in connection with the theories of a former land connection between Africa and South America. Moreover, most of the 22 genera are represented by cosmopolitan, or "tramp," species. The ant fauna of Madagascar is surprisingly rich, not less than 40 genera being represented in this small area. Only 4 of these, however, are endemic, while 34 are common to the Ethiopian and 32 to the Indo-Malayan, so that the affinities appear to be about equally divided between these two regions.

Part II covers 231 pages and includes the systematic study of the ants collected by Messrs. Herbert Lang and James P. Chapin, of the Museum's Congo Expedition, and also of a smaller collection made in the same region by Dr. J. Bequaert. Numerous maps show the distribution of the genera and many of the species are illustrated by excellent drawings, mostly executed by Mrs. Helen V. Ziska. Especially noteworthy are the twenty-two plates reproducing photographs of the nests of ants and the surroundings in which these insects live. Three of these illustrations are from unique photographs of East African driver ants, by Dr. J. Vosseler, offering striking examples of their migrations and of their rapacity. The others were made by Mr. Herbert Lang in the field and several of them show nesting habits not heretofore figured. The systematic treatment of the 229 species represented in the collection contains comprehensive accounts of the characters and habits of the various subfamilies and genera, which will prove valuable to future African collectors and students of ants. Sixty-nine forms—species, subspecies, and varieties—are described in this part as new to science. Very interesting is the fact that a number of these new forms have been recovered from the stomachs of frogs and toads collected by the expedition. Frequently these specimens were in a perfect state of preservation. Professor Wheeler justly calls attention to the remarkable results which may be obtained in the tropics through this novel way of collecting ants.

THE BOY SCOUT MUSEUM

THE Boy Scout Museum at Kanohwahke Lakes, Interstate Park, as developed during the summer of 1921, accomplished an interesting piece of work. Financed with a thousand dollars contributed by the Interstate Park Commission, and five hundred dollars added by a friend, it was the means through which nature study became a subject of keen interest in twenty-six camps, attended by 19,000 boys and girls, the boys being in the majority. The staff of the Boy Scout Museum conducted nature hikes, gave special instruction, delivered lectures illustrated by the stereopticon, and established branch museums in several camps.

In order to carry out the work efficiently, several departments were created. The photographic department, besides taking nature pictures, handled the photographic work of all the Scouts at cost. The department of preparation made ready most of the exhibits, which included mounted birds and nests, butterflies and moths, caterpillars, wasps' nests, minerals, fungi, wood specimens, and preserved fish, besides several models showing the formation of soils, the cause of forest destruction, and a microanalysis of water. The botany department took care of the botany exhibit, which was changed three times

The Puma Group in the American Museum

The Boy Scouts Museum has many willing field workers that scour the surrounding country and bring back to the museum objects that have aroused their curiosity. Here is a group of Scouts making permanent records of selected leaves. For the purpose a leaf is covered with paint corresponding to the actual coloration. A blank piece of paper is then placed in contact with the painted surface and pressure is applied, with the result that a colored impression of the leaf is left on the paper

a week, and which included a "What is it?" exhibit, to be answered by the Scouts.

The department of zoölogy had charge of the live exhibits, such as the snakes, turtles, salamanders, crayfish, mice, guinea pigs, rabbits, and pigeons. There were fourteen species of snakes, many loaned by the New York Zoological Society. These were the most interesting of the exhibits, some of the children never having seen a snake before. The big gopher and bull snakes, the rattlesnakes and copperhead, the small hognose and ring-necked, the little milk snake, and the grass and water snakes were all there, and all appreciated. Many demonstrations a week were given by "Uncle Bennie"—as Mr. B. T. B. Hyde, the director, was known to the boys and girls—on how to handle snakes; and in numerous cases the inherent fear of snakes was dispelled. The veterinary work of the department was most interesting. At least half a dozen animals and birds were operated upon. For example, the staff set the leg of a little rabbit, mended the broken wing of a bird, removed a fishhook from the nose of a turtle, and placed the broken back of a snake in splints—and it healed!

During the last three weeks of the summer, when the radio department was in operation, news was received daily from Washington and New York, and sent out to each of the Scout camps, thus providing a daily morning newspaper.

The plans for the present summer provide for a more intensive piece of work with a greater number of instructors, nineteen including Mr. Hyde; a traveling museum and a traveling nature library will be added to the equipment. During the winter months, instructive nature talks have been given to many groups of settlement boys and girls, as well as special instruction to Scout leaders and those in training to become leaders. Three Scout museums have been started by Mr. Hyde during the past winter: one at Rutherford, New Jersey, attended by 76 boys; another at Plainfield, New Jersey, with an attendance of 35 boys; and one at the Educational Alliance, 197 Broadway, New York, with 32 boys in attendance.

THE SCHOOL NATURE LEAGUE

THE School Nature League met in the auditorium of the American Museum on the evening of March 3. Mr. George S. Sherwood, on behalf of President Osborn, cordially welcomed the guests and introduced Mrs. John I. Northrop, president of the School Nature League, who took charge of the meeting.

Mrs. Northrop briefly sketched the history of the School Nature League and told in an entertaining and vital way of the good it is accomplishing in enriching and uplifting the lives of the children. Pictures were then thrown upon the screen showing children engaged in nature study, and the creatures and other things of nature which occupy their attention.

Dr. John Finley was introduced and enlivened the evening by the humorous remarks which shot

through his more serious discourse. He told of his visit to the nature room in Norfolk Street and gave his hearty endorsement to the work of the Nature League. Following this, he painted in beautiful language a picture of "the wider nature room of the great out-of-doors" of the east, west, north, and south, of our great country.

Mr. Morgenthau, who has also visited the nature room, advocated in earnest words the extension of the work of the League.

A series of motion pictures was then shown, presenting the life of early spring—the peepers, tadpoles, frogs, woodchucks, apple blossoms, robins nesting, etc.—followed by a series of autumn scenes. The running fire of interpretative comments by Mr. Sherwood accompanying these pictures greatly enhanced their value.

The audience was enthusiastic and at the close of the evening chatted informally at the door, where representatives of the School Nature League were kept busy handing out literature of the League and recording the names of new members.

OTHER INSTITUTIONS

Six scientific research expeditions, which will be engaged in work for periods ranging from two to five years, are contemplated by the Field Museum. Four of the six expeditions will devote themselves to areas of South America and two will be sent to the East.

The department of geology will begin its research work in the gem-producing regions of Brazil, one of its purposes being to secure a full series of metals associating with the diamond. It will later turn its attention to the gold- and iron-mining sections of that country and to the silver- and copper-producing areas of Bolivia and Peru. The work will be done under the direction of Dr. Oliver C. Farrington, the curator of the department.

An expedition headed by Mr. E. S. Riggs, of the department of historical geology, will devote itself to the search for fossil vertebrates, visiting for this purpose the Santa Cruz beds of Patagonia and certain areas of Pampean formation in northern Argentine, as well as examining cave deposits in Brazil.

An interesting range of life zones will be covered by the zoölogical and botanical expeditions, which will work together in the interior of the Sierras of Central Peru and about the sources of the Amazon. Dr. Wilfred Osgood and Mr. J. Francis MacBride, the former curator of zoölogy, the latter assistant botanist, will have the direction of the work that is planned.

The archæological expedition, under the leadership of Dr. J. A. Mason, will devote itself to the solution of problems relating to the ancient cultures of South and Central America. An interesting phase of the undertaking will be the attempt to furnish proof of a connecting link between the Maya civilization and that of the Inca.

The work in the East promises to be no less interesting than that planned in South America. Dr. Fay-Cooper Cole will depart in June for the Malay Peninsula and subsequently will attempt to reach the interior of Borneo. Dr. B. Laufer, curator of the department of anthropology, will study the aborigines of Hainan, the large island off the southern coast of China. The enrichment of the Chinese collections of the Field Museum is one of the results to be anticipated from the proposed survey, to be undertaken by Dr. Laufer, of the Province of Fukien and Manchuria.

Dr. E. C. N. van Hoepen has been appointed director of the Orange Free State National Museum, located in Bloemfontein.

The Carnegie Institute of Pittsburgh held its twenty-sixth annual celebration of Founder's Day on April 27. President Henry Fairfield Osborn, of the American Museum, regretted his inability to be present and requested Director W. J. Holland, of the Carnegie Institute, to represent the American Museum on that occasion.

The Royal Academy of Belgium is celebrating its one hundred fiftieth anniversary May 23-24. A commemorative session will be held at the Palais des Académies on the latter date. The presence of delegates from foreign academies and associations is anticipated.

THE MADAME CURIE RADIUM FUND

The Madame Curie Radium Fund Committee, (Mrs. William Brown Meloney, Chairman), reports that the sum of $56,413.54, the balance of the contribution after the gram of radium and the mesothorium presented to Madame Curie had been paid for, was invested, as required by the statutes of the state of New York, in securities legal for trustees. As Madame Curie's status is that of a non-resident alien, and in order to stabilize the annual income regardless of changes in the income laws, the investments have been made entirely in as long-term state and municipal bonds as could be obtained, excepting a balance of a few hundred dollars, which was put into Liberty Bonds, as these could be had in denominations as low as fifty dollars. All of the investments are exempt from all income taxes in this country. The net income will be about $2500.

TRAILS IN THE ADIRONDACKS

In an article contributed to the *New York Evening Post*, Mr. W. G. Howard, assistant

superintendent of state forests, New York State, points out that much has been done to make the Adirondacks a place of easy sojourn for the camper. No less than 350 miles of trail have been cleared, and selected trees over nearly a third of this mileage have been labeled with metal markers, colored to indicate the general direction in which the trails lead,—red for east and west, blue for north and south, yellow for the diagonal trails. About 180 public camp sites have been prepared. Each of these is equipped with a fireplace and a space to pitch a tent. The construction of these trails and the establishment of the camps were facilitated through an appropriation made for the purpose by the Legislature of 1920. The Legislature of 1921 failed, however, to continue the appropriation. Desirable as is economy in the conduct of public enterprises, there would seem to be many retrenchments that could with better propriety be made than one which retards the development of the recreational facilities of a region so attractive.

RECENT DISCUSSIONS CONCERNING EVOLUTION

To THE discussion regarding evolution, precipitated by the attack of the Hon. William Jennings Bryan upon the doctrine in question, several members of the scientific staff of the American Museum have contributed. In *The New York Times* of March 5 President Osborn made a thoughtful reply to Mr. Bryan, insisting that "truth is truth and must prevail" and expressing the opinion that if Mr. Bryan "with an open heart and mind, would drop all his books and all the disputations among the doctors and study first-hand the simple archives of Nature, all his doubts would disappear; he would not lose his religion; he would become an evolutionist." In *The New York Evening Post* of April 1, Dr. William K. Gregory, curator of comparative anatomy, showed the vulnerability of Prof. Francis P. Le Buffe's assertions, particularly as applied to the central exhibit of the hall of the Age of Man, in the American Museum. Dr. Gregory has also given a number of addresses recently on different phases of evolution. Before the Wagner Free Institute of Science in Philadelphia he delivered between March 4 and March 25 four lectures on "The Evolution of the Human Face;" on March 29 before the Galton Society he presented "Notes on the Origin and Classification of *Homo sapiens*," and on April 10 before the New York Academy of Sciences a paper which he had prepared with the collaboration of Dr. Dudley J. Morton, entitled "Has the Human Foot Been Derived from a Gorilloid Type?" Dr. Robert Cushman Murphy, associate curator of the department of ornithology, spoke before the Park Church in Elmira—a Congregational church founded by a brother of Henry Ward Beecher—on "Bryan and Evolution," in which he pointed out that science has no quarrel with religion and then proceeded to present from many angles the evidence for evolution.

CONSERVATION

In THE November-December issue of NATURAL HISTORY attention was directed to the prospective celebration in April of Conservation Week. The New York City Federation of Women's Clubs, of which Mrs. Richard M. Chapman is president and Mrs. Charles Cyrus Marshall, chairman of conservation, arranged an inspiring program to cover the seven days from April 2 to April 8 inclusive that were dedicated to the arousing of public interest in the protection of natural resources. A day was devoted to each of the following subjects: "Conservation and Patriotism," "Our Forests and Streams," "National and Local Parks," "Wild Life," "Great American Conservationists and Naturalists," "Conservation and Nature Study for Children." On April 3 a play, *The Spirit of Conservation*, was produced at the Selwyn Theater as part of the program.

Although the exercises were held for the most part at the Hotel Astor, three of the institutions of Greater New York were the scenes of gatherings. The topic of April 4, "Our Forests and Streams," was presented at the American Museum. On April 7 Dr. G. Clyde Fisher, of the department of education, American Museum, delivered before the Federation his address, "With John Burroughs in His Favorite Haunts." In furtherance of the purposes of Conservation Week he lectured, March 31, at the Ethical Culture School, on "The Conservation of our Forests," the address being delivered then rather than later because of the imminence of the vacation period of the school.

So MANY of the Big Trees are located in national parks or on privately owned lands that one is apt to overlook the fact that several thousand individual members of this royal family are under the custodianship of the United States Forest Service. As intimated by Mr. Ansell F. Hall in the article on "The Forests of the Roosevelt-Sequoia National Park," contributed to this issue, the inflexible policy of the service has been to guard these trees with zealous care. Not a single Giant Sequoia within its control has been laid prostrate by the ax. Only fallen trees that were threatened with decay if not removed have been sold for lumber. By its actions in the past the Forest Service has proved that it is faithful to its trust, and lovers of these ancient trees can feel confident that the same scrupulous and zealous guardianship will be maintained in the future.

THE FATHER AND SON LIBRARY

ALTHOUGH the influence of the school, the church, and the community on the development of the boy is not to be underrated, the principal responsibility for the shaping of his character, for coördinating what he absorbs through the other agencies and heading his life in the right direction, devolves upon the home. *The Father and Son Library*, recently published by the University Society, is, as its subtitle implies, a practical home plan of all-round development for the boy. Frank H. Cheley, the editor-in-chief, and Lansing F. Smith, the consulting editor, have had in the carrying out of the project the coöperation of more than a dozen associate editors, each a specialist in his field and therefore well fitted to bring out the best in the subject under his supervision. There are twenty volumes in all, the first of which is a volume of suggestion and guidance for the father, the remaining nineteen being addressed to the boy and taking cognizance of his interests and aspirations as well as awakening these. The volumes range in subject matter from "Sports and Games," "Tools and Handicrafts," and "Camping Out," to "Citizenship," "Choosing a Life Work," and "Nature's Secrets."

The editing of the two volumes devoted to the subject last mentioned was to have been entrusted to John Burroughs but his death made impossible the carrying out of this plan. Dr. G. Clyde Fisher, associate curator of the department of education, American Museum, whose years of intimate association with Burroughs would assure his sympathetic prosecution of any plan in which the Sage of Slabsides had been interested, was then chosen to edit "Nature's Secrets." Dr. Fisher defines the two volumes as nature helps rather than natural histories. They were prepared with the thought of enabling the boy to find answers readily to the many questions about nature which even a slight acquaintance with the great out-of-doors is bound to bring to the lips. In addition to contributions from other eminent students of animal and plant life, two charming essays by Burroughs are included in the first of the two volumes. Among the contributors to the second volume are Mr. John T. Nichols, associate curator of recent fishes, American Museum, and Dr. G. Kingsley Noble, associate curator in charge of herpetology in that institution, both of whom have prepared articles in their respective fields that will not only enable boys to identify the fishes and the reptiles they observe but will give them a better sense of appreciation for these interesting divisions of the animal kingdom. The second volume closes with the biographies of six great American naturalists, originally selected for the *Mentor Magazine* by Dr. Fisher and first published in that medium. Although, because of their interest for readers of NATURAL HISTORY, stress is here given to the volumes on "Nature's Secrets," they are but typical from the standpoint of quality of the other volumes that constitute *The Father and Son Library*.

EXCAVATIONS AT LA QUINA

THE American School of Prehistoric Studies in France has been enjoying the concession to work at the La Quina archæological station, a Mousterian culture deposit of Neanderthal age rendered famous by the discovery of the La Quina skull, a cast of which is shown in the hall of the Age of Man in the American Museum. The opportunity thus offered American students not only to inform themselves of the facts of French archæology, but also to become acquainted with advanced methods of excavation which they may later apply in the American field, is due to the generous action of Dr. Henri Martin, the owner of the La Quina site.

During the season of 1921 Professor George Grant MacCurdy, of Yale University, was in charge of the excavations. He will be succeeded during the season of 1922 by Mr. Charles Peabody, Chairman of the Board of Prehistoric Studies.

The Paris office of the American School is 38, Rue de Provence, and American visitors to Paris who desire to see the La Quina station will do well to register there and communicate with Mr. Peabody regarding a visit to La Quina.

EXHIBIT OF MAMMAL PHOTOGRAPHS

THERE is at present on view in the hall of woods and forestry of the American Museum an exhibit of photographs of mammals that no one who is interested either in wild life or in photography can afford to miss. It was President Henry Fairfield Osborn, of the American Museum, who first advocated such an exhibit and gave the undertaking support through his advice and encouragement. A large measure of credit is due to Mr. Herbert Lang, of the department of mammalogy of the American Museum, upon whom fell the responsibility, in the absence of Mr. H. E. Anthony, the chairman of the committee in charge of the arrangements, of assuming the direction of things. With the assistance of the other members of the committee, Dr. G. Clyde Fisher and Dr. Robert Cushman Murphy, he came into correspondence with the foremost animal photographers in the country, soliciting their contributions, passed upon the pictures submitted—for the committee reserved the right to decline photographs not deemed suitable—and supervised their arrangement. In connection with the responsibility last mentioned he had the assistance also of Mr. W. E. Belanske and Mr. T. D. Carter. The

result is a remarkable exhibit, consisting of no less than 1500 pictures of mammals in the wild state or in captivity, contributed by more than 100 contestants. In each of these two categories, prizes will be awarded. For the best photographs of mammals in the wild state there are three prizes of $100, $60, and $40, respectively; for the best photographs of mammals in captivity, exclusive of domestic animals, prizes of $50, $30, and $20, respectively, are offered. A certificate of honorable mention will be given to no more than five additional exhibitors in each category. The American Society of Mammalogists will be asked to select the judges. The exhibition of pictures was formally opened on May 15 and it is anticipated that it will be kept on view at least until June 15.

AT A recent meeting of the Board of Trustees of the American Museum the following resolutions were adopted:

Resolved, That the Trustees accept with grateful thanks the collection of gems and precious stones which Doctor George F. Kunz has presented to the American Museum of Natural History, in the name of his wife, Sophia Handforth Kunz, and in view of this addition to the Museum's mineral collection and of the valuable service rendered to the Museum by Doctor Kunz, take pleasure in hereby electing Sophia Handforth Kunz a *Patron*.

Resolved, That the Trustees desire to express to Mr. Charles R. Knight their appreciation of his rare artistic ability and unusual skill in creating the mural paintings in the Age of Man Hall, which are distinct contributions to science and are especially valuable in visualizing the ancient life of the earth, and in recognition of his services take pleasure in hereby electing him a *Life Member* of The American Museum of Natural History.

SINCE the last issue of NATURAL HISTORY the following persons have been elected members of the American Museum:

Life Members: MESDAMES J. S. MORGAN, JR., STELLA EDRINGTON PENN, VICTOR M. REICHENBERGER; the MISSES A. J. BORDEN, MARGARET H. ELLIOT, ANNE W. STUYVESANT; MESSRS. FRANK L. BABBOTT, JR., J. SANFORD BARNES, JOSEPH DOWD, HENRY E. GREGORY, CHARLES R. KNIGHT, and WADSWORTH RUSSELL LEWIS.

Sustaining Member: MRS. VAN S. MERLE-SMITH.

Annual Members: MESDAMES FRANCIS MCNEIL BACON, JOSEPH BLAKE, EMILY PALMER CAPE, MADELINE T. DICK, WALTER DOUGLAS, W. C. EUSTIS, GEORGE A. EYER, EMIL GOLDMARK, WILTON MERLE-SMITH, HENRY WISE MILLER, FREDERICK W. MOSS, MATTHEW O'NEIL, CHARLES E. SHEPPARD, GEORGE E. VINCENT; the MISSES KATHARINE ALLEN, FRANCES N. NIGHTINGDALE, ELIZABETH M. VAN WINKLE, LOUISE WHITIN; DOCTORS PERCEVAL M. BARKER, HAMILTON B. FROBISHER, PERCY HUGHES, KENNETH R. MCAPLIN, HAROLD NEUHOF, DOUGLAS W. SIBBALD; PROFESSORS CHAS. B. DAVENPORT, EDWARD B. CHAMBERLAIN; MESSRS. FREDERICK L. ALLEN, CHARLES BIBERMAN, SAMUEL SHIPLEY BLOOD, KENNETH BOARDMAN, PAUL HYDE BONNER, EDW. P. BORDEN, CHARLES A. BOSTON, JACKSON H. BOYD, JAMES A. CARR, H. L. CRAWFORD, GEORGE HAROLD EDGELL, C. V. FERGUSON, OLIVER D. FILLEY, C. B. HILLHOUSE, F. HOYER, ARTHUR F. KRAKEUR, THOMAS W. MARTIN, PHILIP J. MCCOOK, VAN S. MERLE-SMITH, JOSEPH L. MORRIS, SIDNEY NEWBORG, JOS. S. RICH, JOSEPH SEEMAN, SAMUEL WASSERMAN, JERE R. WICKWIRE, and W. IRVING WOLF.

Associate Members: the MISSES ANNIE C. CHILD and IOLA A. SMITH; DOCTORS CARL ALTHANS, CHARLES E. AMES, E. C. CASE, GEORGE E. DICKINSON, J. H. EHLERS, LELAND O. HOWARD, PERCY R. HOWE, N. C. IKNAYAN, C. E. NORTON, R. O. RAYMOND, T. WINGATE TODD; the REVEREND STEPHEN DOWS THAW; PROFESSOR FREDERICK S. PAGE; MAJOR CHARLES G. STURTEVANT; MESSRS. GEORGE GUY BAILEY, JR., LEONARDO P. CAMPAGNA, ROBERT BRENT CHILTON, PAUL CLARK, R. A. CORBETT, E. M. GRAVES, CHARLES E. HADLEY, A. IRVING HALLOWELL, FREDERICK W. HINCKLE, A. B. HOWELL, ROBERT B. HUTCHESON, H. H. IRVINE, WELLINGTON B. JOHNSON, HERVEY S. KNIGHT, CLAUDE MACDONALD, HAROLD L. MADISON, CHARLES E. MARSH, JOHN H. MILLER, ALLEN MORGAN, R. M. PATTERSON, HARRY G. POLLARD, HENRY A. REDFIELD, CHARLES RUZICKA, GEORGE BRYAN SHANKLIN, W. W. SHARRARD, W. J. SIMPSON, EDWIN C. STARKS, J. M. STERLING, E. C. SWABEY, EARL H. TSCHUDY, OSCAR C. WHITNEY, J. B. WILBERDING and BRADFORD WILLARD.